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FOOD REVIEW

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The Graying of America

One of the biggest and most important demographic changes facing the United States is the aging of our population. Both the number and proportion of older people are increasing. In 2000, 35 million Americans were age 65 and older, representing 12.4 percent of the total population. The older population is expected to reach 54 million in 2020 and more than double by 2050, accounting for 20 percent of our population.

The graying of America may have wide-ranging implications for the food industry if future spending patterns of the elderly follow those of today's older age group. Researchers with USDA's Economic Research Service (ERS) examined at-home food expenditure data and found that households headed by individuals age 65-74 spent more on cereal and cereal products, dairy products, poultry, and processed vegetables than other age groups, while households headed by individuals age 75 and older spent more on fruit and nonalcoholic beverages. The elderly generally spend less eating out. Away-from-home food expenditures for those age 75 and older were 30 percent lower than the average of all households and 23 percent lower than those age 65-74.

Older Americans today are living longer, are better educated, and are more prosperous than previous generations. But, disparities among the older population continue to exist between men and women, racial and ethnic groups, and income classes.

Analysis by ERS shows that 94 percent of households with an elderly person in 2000 were food secure—access at all times to enough food for an active, healthy life for all household members. Eighty-eight percent of U.S. households with no elderly persons present were food secure in 2000. When faced with limited money or resources for food, some elderly households turn to Federal and community food assistance programs. An average of 1.7 million Americans age 60 and older received food stamps each month in 2000. However, only about a third of older people who are eligible participate in the program. USDA and some States have begun testing Food Stamp Program changes designed to increase participation by eligible older people.

Two areas of caution for the elderly in the new century include changing nutrition needs and complications from foodborne illnesses. As people age, their energy needs decline. Thus, older individuals need to make wise food choices, selecting nutrient-dense foods and limiting "extras." ERS analyses of USDA food consumption survey data show that most older Americans are having trouble fitting the recommended number of daily food group servings into their decreased "calorie budgets," especially older women. For example, only 6 percent of older men and 3 percent of older women consumed the recommended number of servings from the milk, yogurt, and cheese group, compared with 26 percent of younger men and 15 percent of younger women.

While older adults have lower rates of foodborne illness infections than most other age groups, they are more likely to have some of the more severe complications. Older people, and those who prepare their food, must continue to be vigilant about safe food practices. In the coming years, the elderly as a share of the U.S. population will reach the highest level in history. How we act to prevent foodborne illness, ensure adequate nutrient intakes, and meet other health and support needs for this group will be important issues not only for older Americans but also for the Nation.

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CONTENTS

The Graying of America

Also Inside

America's Older Population

Carolyn C. Rogers

Older Americans have increased steadily in number and proportion of the total U.S. population. The population age 65 and older numbered 35 million in 2000 and is expected to more than double by 2050. The older population was 12 percent of the total population in 2000 and will increase to 20 percent by 2050. Moreover, the oldest segment of the older population, those age 85 and older, has been increasing more rapidly than any other age group.

As America enters the 21st century, its older population is living longer, is better educated, and is more prosperous than previous generations. Despite these advances, disparities among the older population persist between men and women, racial and ethnic groups, and income classes. With the leading edge of the baby boom generation reaching age 65 in 2011, growth of the older population will increase more rapidly. In light of the rapid growth of the older population over the next 50 years, there is an urgent need for policymakers, researchers, and community leaders to better understand the health and economic needs of this segment of American society.

This article uses data from the 2000 census and the March 2001 Current Population Survey (CPS) and selected previous years. Because the CPS excludes the institutional population, such as those residing in nursing homes, CPS estimates of the number of older persons are lower than those obtained from the decennial census, particularly for persons at advanced ages. As of 2000, 1.1 percent of persons age 65-74, 4.7 percent of persons age 75-84, and 18.2 percent of persons age 85 and older were in nursing homes.

People Age 85 and Older Are Fastest Growing Segment of Older Population

Both the number and proportion of older people relative to the total U.S. population are increasing. In 2000, nearly 35 million Americans were age 65 and older, representing 12.4 percent of the total population. The number of older Americans has increased more than tenfold since 1900, when

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people age 65 and older totaled 3 million, or 4 percent of the total U.S. population. The older population is expected to reach 54 million in 2020 and more than double by 2050 (table 1). The aging of the baby boom generation, whose members were born between 1946 and 1964, will accelerate this growth, as the cohort begins to turn 65 in 2011.

The increase in life expectancy during the 20th century has been remarkable. Average life expectancy at birth was about 47 years in 1900 and increased to 70 years by 1960 and 77 years by 2000. Currently, life expectancy at birth is 80 years for women and 74 years for men. If mortality rates remain constant, 65-year-olds in 2000 are expected to live another 18 years on average. The aging of the population is also reflected in the increase in the median age of the population, from 33 in 1991 to 35 in 2001.

The increase in the size of America's older population is accompanied by rapid growth in the "oldest old," or the population age 85 and older. The oldest old was 12.1 percent of the older population in 2001, up from 9.9 percent in 1991. The population age 85 and older is currently the fastest growing segment of the older population and is expected to grow faster than any other age group. U.S. Census Bureau projections suggest that the oldest old population could grow from about 4 million in 2000 to 19 million by 2050. By 2050, nearly 24 percent of the older population is projected to be age 85 and older. The size of this segment of the population is especially important for the future of the health care system because the oldest old tend to be in poorer health and require more services than the younger old (under age 85).

The older population is concentrated in the South, with 12 million persons age 65 and older. Between 1990 and 2000, the older population in the West and South grew faster than in other regions, paralleling the regional pattern of growth of the total U.S. population. The West experienced the highest percentage increase of the older population (20 percent), and the South's older population grew 16 percent. The proportion of the population age 65 and older varies among States. In 2000, Florida, West Virginia, Pennsylvania, Iowa, and North Dakota had the highest proportions of older persons. This share of the total population is affected by the State mortality rate, the number of older persons who migrate to a State, and the number of younger persons who move to other States. For example, the high proportion of older persons in Florida results from high inmigration, whereas the high proportions of the elderly in the other States are due to youthful outmigration.

Throughout the United States, rural areas generally have a higher proportion of older persons than urban areas. The elderly constituted nearly 20 percent of the rural population and 15 percent of the urban population in 2001. Rural areas have different needs for health care delivery, transportation, and access to social services. For example, low-density, sparsely populated rural communities are limited in their ability to provide health care services in their own jurisdictions and are often located far from comprehensive, state-of-the-art medical facilities, which are concentrated in metro centers.

Older Women Are More Likely To Be Widowed Than Older Men

Women constitute a larger share of the older population, especially among the oldest old. In 2000, women represented 59 percent of the U.S. population age 65 and older and 71 percent of those age 85 and older. Older women are less likely than older men to be currently married and are more likely to live alone. Because women live longer than men, they are more likely to experience declining health and dwindling economic resources.

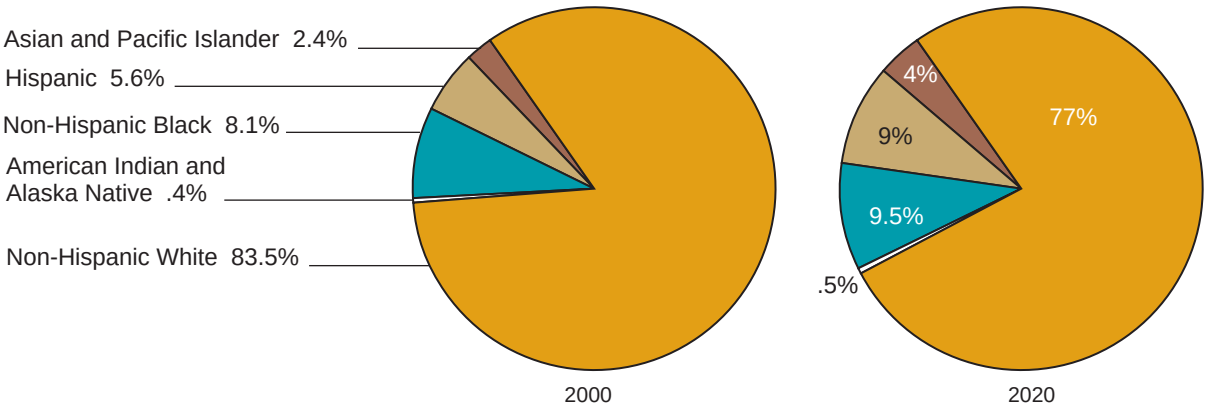
Today's older population is predominantly White, but as the older population increases, it is becoming more racially and ethnically diverse. In 2000, the U.S. older population was 84 percent White, 8 percent Black, 2 percent Asian American, less than 1 percent American Indian, and 6 percent Hispanic (fig. 1). By 2020, the share of the older population that is White is expected to decline 7 percentage points to 77 percent. Hispanics are projected to account for 9 percent of the older population in 2020. Hispanics are the fastest growing ethnic segment of the older population and are projected to increase from about 2 million in 2000 to nearly 5 million in 2020. Over the next 50 years, programs and services for the older

Table 1—The Older Population Is Expected To More Than Double by 2050

	1990	2000	2020	2050
		Millions		
Total, age 65 and older	31.2	35.0	53.7	82.0
Age:				
65-74	18.1	18.4	31.5	36.0
75-84	10.1	12.4	15.5	26.6
85 and older	3.1	4.2	6.8	19.4
		Percent		
Older population as share of total U.S. population	12.6	12.4	16.6	20.3
85 and older as share of 65-and-older population	9.9	12.1	12.6	23.6

Source: U.S. Census Bureau, estimates and projections from the Census Bureau Web site, www.census.gov/population/estimates/nation

Figure 1—The Older Population Is Becoming More Racially and Ethnically Diverse

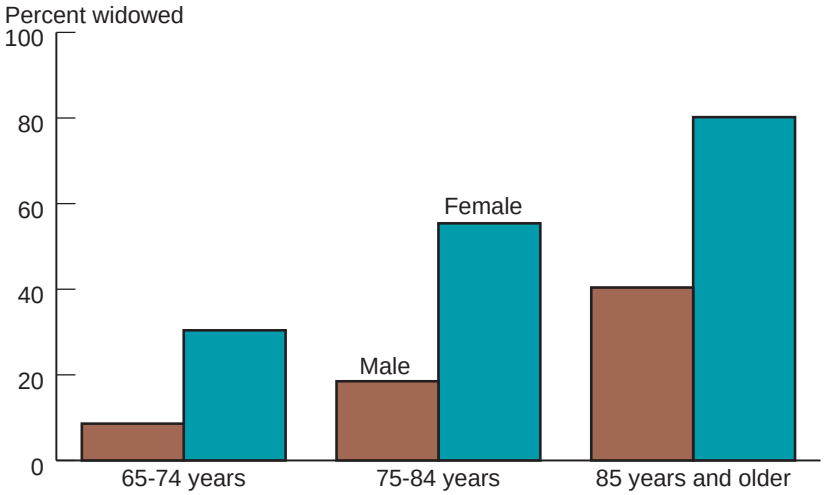


Source: Federal Interagency Forum on Aging Related Statistics, *Older Americans 2000: Key Indicators of Well-Being*, 2000; and U.S. Census Bureau, Internet release on population projections, January 2000.

population will require greater flexibility to meet the demands of a diverse and changing population.

Marital status can strongly affect a person's emotional and economic well-being by influencing living arrangements and availability of caregivers among older Americans with an illness or disability. In 2001, 78 percent of men age 65-74 were married, compared with 55 percent of women the same age. Among persons age 85 and older, 52 percent of men were married, compared with only 13 percent of women. Older women are more likely to be widowed than older men due to a combination of factors, including gender differences in life expectancy, the tendency for women to marry men who are slightly older, and higher remarriage rates for older widowed men than for widowed women. Widowhood increases with advancing age, as does the likelihood of living alone. In 2000, 30 percent of women age 65-74 were widowed, but by age 85, 80 percent were widowed (fig. 2). Older men are less likely to be widowed. Many older persons who are widowed live alone and are more likely than other older persons to lack social support networks, to report themselves in poorer health, and to experience poverty.

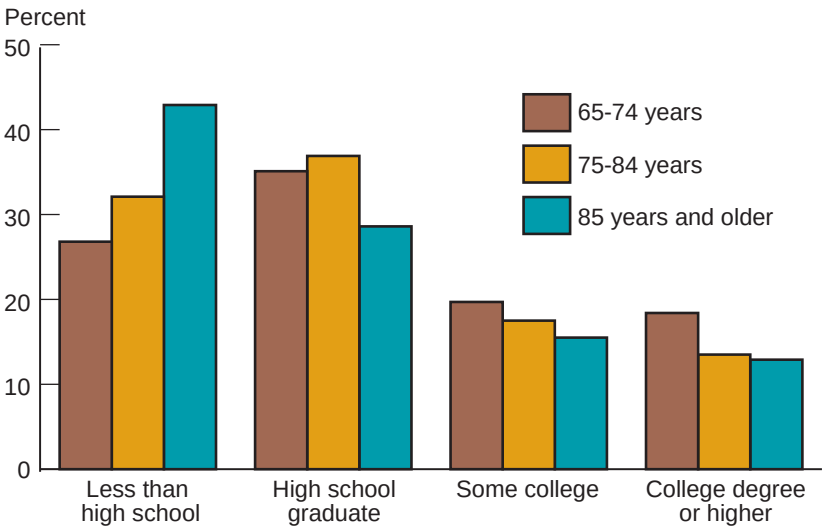
Figure 2—Older Women Are More Likely To Be Widowed Than Are Older Men



Source: March 2001 Current Population Survey data file.

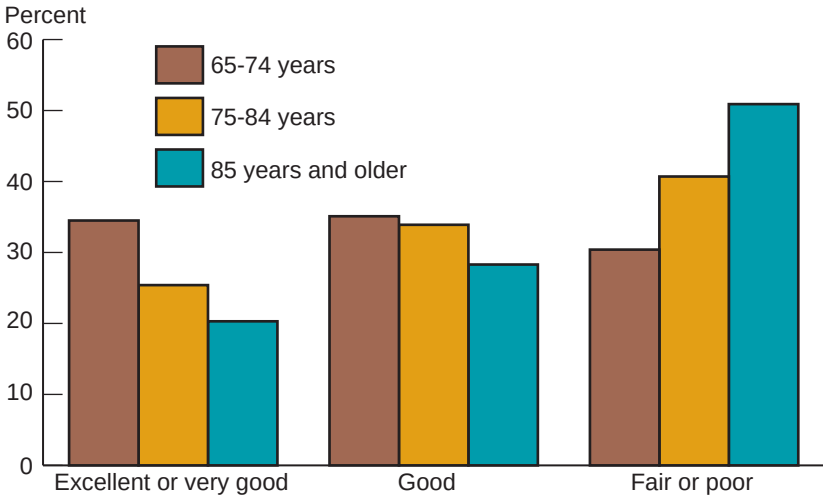
Higher levels of education are usually associated with higher incomes, higher standards of living, and above-average health status among older Americans. The current generation of older Americans is more highly educated than previous cohorts of older persons, and this trend is expected to continue. In 1950, only 18 percent of America's older population had completed high school, but by 2001, 35 percent of people age 65 and older had completed high school. The younger old in 2001 were better educated than the oldest old, reflecting educational gains over time. About 43 percent of the elderly age 85 and older had not completed high school, compared with only 27 percent of those age 65-74 (fig. 3). The proportion of older persons that had some college training was higher among the younger old (38 percent) than among the oldest old (28 percent). Despite the overall increase in educational attainment, substantial educational differences exist among racial and ethnic groups of older Americans. The educational level of the elderly has great influence on their current in-

Figure 3—The Younger Old Are Better Educated Than the Oldest Old



Note: "Younger old" are age 65-74; "oldest old" are age 85 and older.
Source: March 2001 Current Population Survey data file.

Figure 4—With Advancing Age, Older Persons' Self-Assessments of Health Decline



Source: March 2001 Current Population Survey data file.

come and retirement benefits, largely through past employment.

Disability Rates Have Declined Among Older People in Recent Years

Self-reported health reflects physical, emotional, and social aspects of health and well-being. This measure correlates closely with measures of physical functioning and mortality. Most older people under age 85 assess their health as good or excellent. As people age, their self-assessments of health as well as physical functioning consistently decline. In 2001, 35 percent of those age 65-74 reported excellent or very good health, compared with 21 percent of those age 85 and older (fig. 4).

Older age is accompanied by an increased risk of certain diseases and disorders. Significant proportions of older Americans suffer from chronic health conditions. Chronic conditions, such as arthritis, diabetes, and heart disease, affect physical functioning and the ability to remain in one's home. These chronic conditions can become a significant health and financial burden not only to those with the condition but also to their families and the Nation's health care system. Furthermore, aging and chronic health conditions can affect the diet and nutritional requirements of the elderly (see "Older Americans Need To Make Every Calorie Count" elsewhere in this issue).

Disability results when illness, chronic disease, or injury limits physical and/or mental functioning. Chronic disability for people age 65 and older declined from 24 percent in 1982 to 21 percent in 1994. In 1994, about 25 percent of older women reported disabilities, compared with 16 percent of older men. Declining disability rates may allow older people to work longer and retire later in life, as well as enjoy better health and participate in social activities for a longer period of time.

Heart disease and cancer have been the two leading causes of death among Americans age 65 and older for the past two decades. Although mortality rates for heart disease have declined by about a third since 1980, over one-third of all deaths are still due to heart disease. Biomedical advances, public health initiatives, and societal changes may reduce mortality and increase longevity.

Health care expenditures cover the cost of physicians' services, hospitalizations, home health care, nursing home care, medications, and other products and services used in treating or preventing disease. The levels of health care expenditures and service usage among older people are closely associated with age and disability status. In 1996, the average annual expenditure on health care (both out of pocket and covered by insurance) was $5,864 among persons age 65-69, compared with $16,465 among persons age 85 and older. Health care can be a major expense for older Americans and a financial burden for individuals with limited income who have a chronic condition or disability. Over 96 percent of older Americans are covered

by Medicare, which provides affordable coverage for most acute health care services.

Long-term care options include nursing homes, home health care, and other assistance in one's home. Nursing home admissions have recently been declining as other forms of health care and services, such as assisted-living facilities and home health care, have increased. Assisted-living facilities can provide an alternative to nursing homes. Although these facilities do not provide skilled nursing care, residents can obtain assistance with activities of daily living, such as bathing, dressing, and mobility. According to a recent national study by the National Center for Health Statistics, in 1999, 11,472 assisted-living facilities were operating nationwide, accommodating 558,400 residents. These facilities are the fastest growing housing option for older people.

Poverty Rates for the Elderly Have Declined

Generally, the economic status of older people has improved markedly over the past few decades, and poverty rates have declined. In 1959, 35 percent of older persons were poor, a poverty rate much higher than that of children (27 percent) or persons of working age (17 percent). By 2000, 10 percent of those age 65 and older were poor, a decline of 2 percentage points from 1990. The relative poverty rate of the older U.S. population in 2000 was on a par with that of working-age persons and lower than the rate of children (16 percent).

Poverty rates among the elderly vary considerably. Poverty is more pronounced among older women, older persons living alone, and the oldest old. Older women are much more likely to be poor than older men: 12 percent of women age 65 and older were poor in 2000, compared with 7.5 percent of men. With advancing age, poverty increases. By age 85, both men and women have higher poverty rates, with the rates for women exceeding those for men. In 2000, 9 percent of persons age 65-74 were poor, compared with 14 percent of persons 85 and older. The poor are at risk of having inadequate resources for food, housing, health care, and other needs. Such persons are more likely to experience food insecurity—uncertainty in obtaining or inability to acquire enough food to meet basic needs because of insufficient money or other resources for food (see "Food Security Rates Are High for Elderly Households" elsewhere in this issue).

The increase in life expectancy in the United States in the 20th century has had a significant effect, and those age 85 and older, the "oldest old," are now the fastest growing age segment of the population.

Credit: Ken Hammond, USDA.

Social Security Payments Are Critical for Many

Most older persons are retired from full-time work. Social Security was started in 1935 as a protection for the economic well-being of retired persons, to be supplemented by other pension income, income from assets, and, to some extent, continued earnings. Since the early 1960s, the proportion of income for older Americans derived from Social Security and pensions has increased and the proportion from earnings has declined. In 2000, 92 percent of people age 65 and older received Social Security, and these benefits are the single most important source of income for the elderly. Social Security benefits provided about two-fifths of the income of older persons, while income from assets, pensions, and personal earnings each provided about one-fifth of total income.

In 1998, Social Security provided over 80 percent of income for older persons with the lowest levels of income. For those in the highest income category, Social Security accounted for about 20 percent of total income. Only 5 percent of persons age 65 and older received benefits from Supplemental Security Income (SSI), a program that provides income to needy disabled, blind, and elderly persons. For persons age 85 and older, Social Security and assets account for a larger proportion of total income, and earnings and pensions a smaller proportion, compared with persons age 65-74 years old.

A large share of the elderly, including the most affluent, receive pensions and asset income in addition to Social Security benefits, if not earnings. Assets may include interest, dividends, income from estates or trusts, and net rental in-

Women live longer and make up a larger share of the older population than men. Because of their longevity, women are more likely to experience widowhood, declining health, and dwindling economic resources.

Credit: Ken Hammond, USDA.

come. Asset income accumulated during a retiree's working years supplement earnings and other income in retirement.

Home equity is by far the single most valuable type of asset held by the elderly. In 2001, 84 percent of persons age 65 and older owned their homes. Most older people live in adequate, affordable housing, but some older Americans need to allocate a large proportion of their total expenditures to housing. According to 1998 data from the Bureau of Labor Statistics' Consumer Expenditure Survey, among households headed by persons age 65 and older, those with income in the bottom fifth of the income distribution allocated an average of 36 percent of all expenditures to basic housing. The burden of housing costs relative to all expenditures declines as income level increases. Elderly households with incomes in the middle fifth allocated 29 percent of their annual expenditures to basic housing, and those in the top fifth of the income distribution allocated 26 percent. When housing expenditures comprise a relatively high proportion of total expenditures, less money is available for health care, savings, and other vital goods and services. Public assistance programs, such as Medicaid and USDA's Food Stamp Program, provide resources to low-income people, including the elderly (see "Food Stamp Participation by Eligible Older Americans Remains Low" elsewhere in this issue).

Net worth (the value of real estate, stocks, bonds, and other assets minus outstanding debts) is another important indicator of economic security and well-being. Greater net worth allows one to maintain a standard of living when income falls because of job loss, health problems, or family changes, such as divorce or widowhood. Large discrepancies exist among older persons in terms of net worth. Households headed by older Blacks had median net worth of about $13,000 in 1999, compared with $181,000 among households headed by older Whites.

Greater life expectancy and changing family and work patterns contribute to the changing face of older Americans. The older population is becoming more ethnically diverse. Older people today are better educated, healthier, and have greater financial resources than previous generations. Age is an important factor in well-being, and significant differences are found in terms of marital status, health, educational level, and economic standing between persons age 65-74 and those age 85 and older. The oldest old is the group most likely to need health care and economic and physical support. Understanding diversity within the older population and the varied needs of this group is critical to designing effective programs and services for the Nation's growing and diverse older population.

References

Federal Interagency Forum on Aging Related Statistics. *Older Americans 2000: Key Indicators of Well-Being,* 2000.

Rogers, Carolyn C. "Rural Health Issues for the Older Population," *Rural America*, Vol. 17, No. 2, Summer 2002.

U.S. Census Bureau. Internet release on population projections, January 2000. **FR**

Older Americans Need To Make Every Calorie Count

Joanne F. Guthrie and Biing-Hwan Lin

As individuals age, their declining energy needs mean they must eat better while eating less. USDA food consumption survey data indicate that most older Americans are having trouble fitting the recommended number of daily food group servings into their decreased "calorie budgets."

While the basic nutrition advice in the *Dietary Guidelines for Americans* and the Food Guide Pyramid applies to healthy adults of all ages, the elderly face some special challenges, particularly declining energy (calorie) needs as metabolism slows down. For some older adults, decreased physical activity may further reduce energy needs, although the *Dietary Guidelines* emphasize that healthy seniors, just like younger adults, should be physically active each day.

Because the amount of food they can eat while maintaining calorie balance is more limited than when they were younger, older individuals must choose wisely, selecting nutrient-dense foods and limiting "extras." To help older adults and others visualize what this means, researchers at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University created an "elderly pyramid" that is narrower than the Food Guide Pyramid for the general population (see box). The more narrow shape of the elderly pyramid indicates that most individuals age 70 and older should choose the smaller numbers of servings within the range recommended by the Food Guide Pyramid.

Congregate meal programs and mobile food services assist seniors and others whose physical limitations make it difficult to shop for or prepare nutritious meals.

Credit: Ken Hammond, USDA.

A more quantitative way of providing food choice guidance would be to compute benchmark food densities for younger and older men and women. A benchmark food density is the number of servings per 1,000 calories an individual consuming a given number of calories would need to consume to meet the Food Guide Pyramid recommendations. For example, a person who consumes 2,200 calories daily should consume four servings of vegetables, according to the Food Guide Pyramid. This consumption level would translate into a benchmark density of 1.8 servings of vegetables per 1,000 calories.

Data from USDA's Continuing Survey of Food Intakes by Individuals, 1994-96 (CSFII 1994-96) were used to examine food intakes of younger men and women, age 19-59, and seniors, age 60 and older. Survey respondents lived in household settings, not in institutional settings, such as nursing homes. Data were collected from a nationwide sample, yielding results representative of the noninstitutionalized American population. The survey collected information on what, when, where, and how much individuals ate during the 3-year survey period. We used 1-day dietary intake data from this survey to examine how much younger and

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older adults ate, to compute benchmark food densities for each age group, and to compare actual intakes of Food Guide Pyramid food groups with recommendations.

As expected, younger adults ate considerably more than their older counterparts. Men age 19-59 reported consuming an average of 2,535 calories per day, compared with 1,940 calories consumed by men age 60 and older. Women age 19-59 reported average intakes of 1,676 calories daily, compared with 1,413 calories per day for women age 60 and older. These figures represent calories from foods consumed, as reported by survey respondents. Previous studies indicate individuals often underreport food intakes, so these figures may be considered lower bound estimates of daily intake. However, the trend to decreased caloric intake with increasing age is clear.

The differences by age and gender in caloric intake indicate that food group benchmark densities would tend to be higher in women and in older adults. The benchmarks computed confirm this suggestion. Benchmark servings for the five food groups are lowest for young men and highest for older women, the group with the lowest calorie intake (table 1). These numbers show just how important it is that older individuals, particularly women, make every calorie count.

More Older Men Than Women Meet Food Guide Pyramid Recommendations

Comparisons of average food group intakes of older men and women with intakes of younger men and women indicate that older individuals eat fewer servings of most food groups than their younger counterparts (table 2). Older men consume fewer servings of grains, vegetables, and meat and meat alternates than younger men, but their intakes fall within the ranges recommended by the Food Guide Pyramid. Older men actually consume more fruit than younger men and meet the minimum recommended number of servings, whereas younger men do not. Neither group meets recommendations for the milk, yogurt, and cheese group.

Younger women are less likely than men to consume recommended numbers of servings; older women are even less likely. Younger women, on average, consume fewer than the minimum recommended number of servings of all of the five food groups except for vegetables. Mean food group intakes of older women are below recommended levels for all food groups. Like older men, older women consume more fruit than their younger counterparts, but their mean intake level of 1.8 servings per day still falls below the recommendation for at least 2 servings daily.

On a per-1,000-calories basis, intake of some but not all food groups is higher for older men and women than their younger counterparts, although not as high as our

Table 1—Benchmark Servings Are Higher for the Elderly

	Males		Females	
Food groups	Age 19-59	Age 60 and older	Age 19-59	Age 60 and older
	Servings/1,000 calories			
Grains	3.9	4.3	4.6	5.1
Vegetables	1.8	2.0	2.2	2.5
Fruit	1.3	1.4	1.5	1.7
Milk, yogurt, and cheese	1.0	1.8	1.5	2.4
Meat and meat alternates (oz. or equivalent)[1]	2.7	3.2	3.6	4.1

[1]Excludes cooked dry beans and peas, which are included in vegetables.
Source: Calculated by USDA's Economic Research Service using data from the Continuing Survey of Food Intakes by Individuals, 1994-96.

Table 2—Intakes of All Food Groups Except Fruit Decline as People Age

	Males		Females	
Food groups	Age 19-59	Age 60 and older	Age 19-59	Age 60 and older
	Total servings			
Grains	8.2	6.6	5.7	4.9
Vegetables	4.3	3.7	3.1	2.9
Fruit	1.4	2.0	1.4	1.8
Milk, yogurt, and cheese	1.6	1.3	1.2	1.0
Meat and meat alternates (oz. or equivalent)[1]	6.8	5.1	4.0	3.7

[1]Excludes cooked dry beans and peas, which are included in vegetables.
Source: Calculated by USDA's Economic Research Service using data from the Continuing Survey of Food Intakes by Individuals, 1994-96.

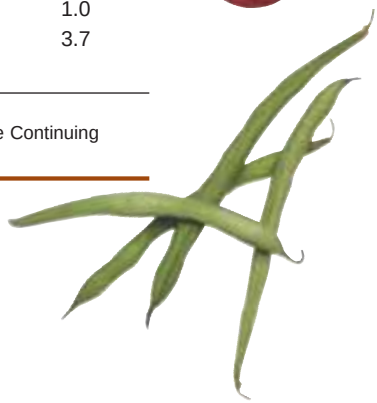


Table 3—Fewer Than One-Half of Older Men and Women Eat Recommended Numbers of Servings of any Food Group on a Given Day

	Males		Females	
Food groups	Age 19-59	Age 60 and older	Age 19-59	Age 60 and older
	Percent meeting recommended servings			
Grains	32	26	23	17
Vegetables	46	42	37	38
Fruit	14	29	19	32
Milk, yogurt, and cheese	26	6	15	3
Meat and meat alternates (oz. or equivalent)[1]	50	36	21	19

Note: These figures also represent the proportion of each population subgroup that meets benchmark food group densities.
[1]Excludes cooked dry beans and peas, which are included in vegetables.
Source: Calculated by USDA's Economic Research Service using data from the Continuing Survey of Food Intakes by Individuals, 1994-96.

benchmark densities. Older men have higher densities than younger men for grains; vegetables; milk, yogurt, and cheese; and, especially, fruit. Older women's diets have higher food group densities than diets of younger women for all food groups except milk, yogurt, and cheese; however, their diets are not sufficiently more dense to make up for older women's low energy intakes. For example, at 1.3 servings of fruit per 1,000 calories, older women's diets have the highest fruit density of any group studied. However, this density does not meet the benchmark density of 1.7 servings per 1,000 calories, and overall intake for older women is below recommended levels.

The figures cited above are averages. Within any group, dietary quality varies, so it is also useful to examine the proportion of individuals within each group whose diets meet Food Guide Pyramid recommendations. As might be expected, on a given day, older individuals are less likely than their younger counterparts to consume recommended numbers of servings of most food groups. The difference was particularly dramatic for the milk, yogurt, and cheese group (table 3). Only 6 percent of older men consumed recommended numbers of servings from this group, compared with 26 percent of younger men. Even fewer older women—3 percent—met servings recommendations for the milk, cheese, and yogurt group, compared with 15 percent of younger women. Because this food group is the major source of calcium in most Americans' diets, these low intakes are a concern.

It should be pointed out that these figures represent only the proportion of individuals meeting servings recommendations on a single day. Were diets measured

Tufts University Researchers Propose an Elderly Pyramid

Using the widely recognized USDA Food Guide Pyramid as a starting point, three Tufts University researchers—Robert M. Russell, Helen Rasmussen, and Alice H. Lichtenstein—developed an "elderly pyramid" specifically geared to the dietary needs of consumers age 70 and older. This pyramid emphasizes the smaller energy needs of the elderly and the resulting need for nutrient-dense food choices. For example, the elderly pyramid recommends at least 6 servings of grains, rather than the 6-11 servings the Food Guide Pyramid recommends for the general population, emphasizing the minimum level as more consistent with lower calorie intake of the elderly. Because the elderly need just as much fiber as younger adults, the modified pyramid adds "f+" fiber icons to indicate the elderly should choose more fiber-rich foods.

One difference between the elderly pyramid and the original pyramid is the addition of a visual recommendation for water. While water is necessary to people of all ages, thirst sensations act effectively to prevent dehydration in younger adults. Decreased thirst sensation is common with aging; an older individual can become somewhat dehydrated yet not be thirsty.

Another, more controversial, difference between the two pyramids is the flag icon atop the elderly pyramid, which represents the possible need for dietary supplements. Absorption of calcium and vitamins D and B_{12} decrease with age. However, there is no consensus as to whether all elderly people need to take supplements of these nutrients. The *Dietary Guidelines for Americans* suggest that older adults may need a vitamin D supplement and that they may wish to consult with their health care provider on whether they need to get vitamin B_{12} from a supplement or from fortified foods. The guidelines recommend calcium supplements for those who seldom eat dairy products or other rich sources of calcium but do not provide specific advice for the elderly.

Although the researchers who developed the elderly pyramid are affiliated with the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, the pyramid is not an official USDA teaching tool. Rather, Tufts researchers, according to the *Tufts Nutrition Communicator*, "are hoping that their pyramid will generate some discussion on how best to address the unique nutrient needs of seniors."

over a longer period of time, more individuals in each group might be found to usually consume recommended numbers of servings. Because it is impractical to collect detailed dietary data for large numbers of days in national samples, we have historically had to rely on shorter term estimates. Statistical methods to estimate usual intakes are being developed and may lead to more precise estimates in the future. Despite these caveats, the differences between younger and older adults provide insights for nutrition monitoring of the elderly population.

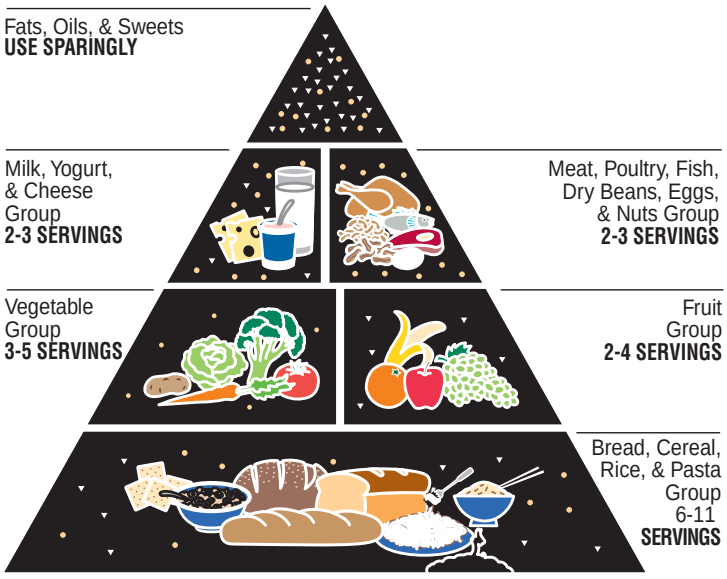
Fruit consumption is a notable exception to the general decline in proportion of individuals meeting serving recommendations as they age. More than twice as many older men met the Food Guide Pyramid recommendations for fruit consumption than younger men—29 percent compared with 14 percent. With 32 percent of older women consuming at least 2 servings of fruit daily, they were the group most likely to meet the recommendation. Among younger women, 19 percent met the fruit recommendation. As individuals age, they may become more health conscious and actively increase consumption of healthful foods, such as fruit. Also, today's elderly may have grown up when fruit was more heavily consumed and are simply continuing habits developed over a lifetime.

Lifestyle differences, such as frequency of eating out, might also explain the tendency of the elderly to consume more fruit. Restaurants, take-out establishments, and other away-from-home food sources play an increasingly large part in the diets of most Americans. Among adults age 19-59, 34 percent of calories were obtained from away-from-home sources in 1994-96. Unfortunately, individuals seem to be less likely to eat fruit when eating away from home: of the 1.5 servings of fruit consumed daily on average by Americans age 2 and older, 1.3 servings, or 85 percent of total servings, are obtained from the home food supply. Older men and women obtain just 20 percent of calories from nonhome food sources and, like all Americans, eat less fruit when eating out. However, since older men and women eat out less, the lack of fruit consumed away from home has less impact on their diets.

Older Men More Likely Than Younger Men To Take Dietary Supplements

Older adults have been reported to be more likely to take vitamin and/or mineral supplements than younger individuals. The *Dietary Guidelines for Americans* stress the importance of wise food choices as the basis of good nutrition; therefore, supplement intake would not be considered an alternative to consuming more nutrient-dense foods. Some older adults, however, may benefit from selected supplements, such as vitamins D and B_{12}. The *Dietary Guidelines* also state that individuals who seldom eat dairy products or other rich sources of calcium could benefit from a calcium supplement.

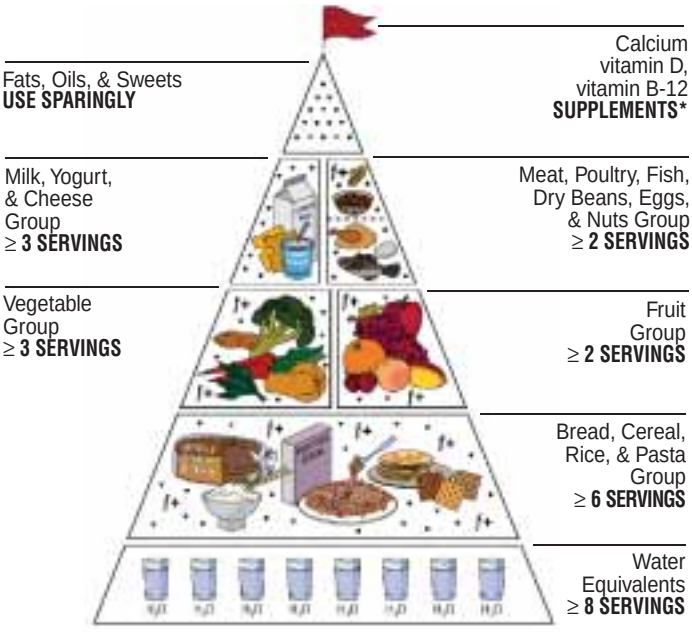
Original Food Guide Pyramid



• Fat (naturally occurring and added)
▾ Sugars (added)
These symbols show fat and added sugars in foods.

Source: U.S. Department of Agriculture/U.S. Department of Health and Human Services

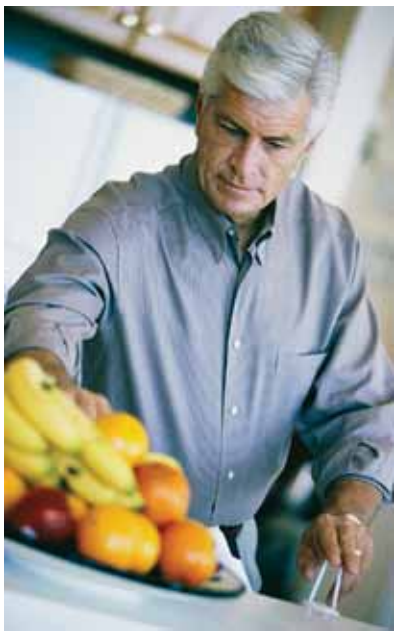
Modified Food Guide Pyramid for 70+ Adults



• Fat (naturally occurring and added)
▾ Sugars (added)
f+Fiber (should be present)
These symbols show fat and added sugars in foods.
* Not all individuals need supplements, consult your health care provider.

Compared with younger age groups, the elderly are much less likely to consume recommended servings of milk and other dairy products, major sources of calcium in the diets of most Americans. The elderly however, do not need to be reminded to include fruit in their diets. Older men and women tend to eat more fruit than younger adults.

Credit: Ken Hammond, USDA.



Credit: Eyewire.

As part of the CSFII interview, individuals were asked if they took vitamin or mineral supplements. More older men than younger men reported taking supplements—47 percent compared with 40 percent (fig. 1). Fifty-five percent of women reported taking supplements, but there was no difference by age. The CSFII 1994-96 collected limited amounts of information about the content of the vitamin-mineral supplements taken by individuals. Most individuals reported taking a multivitamin or a multivitamin-mineral product but provided little or no specific information about the nutrients contained in such products. A small number of individuals reported taking specific supplements, such as calcium or the vitamins recommended by the *Dietary Guidelines*. Without more information on the content of the vitamin-mineral supplements taken by individuals, it is difficult to assess the extent to which older individuals chose supplements containing the nutrients emphasized by the *Dietary Guidelines.*

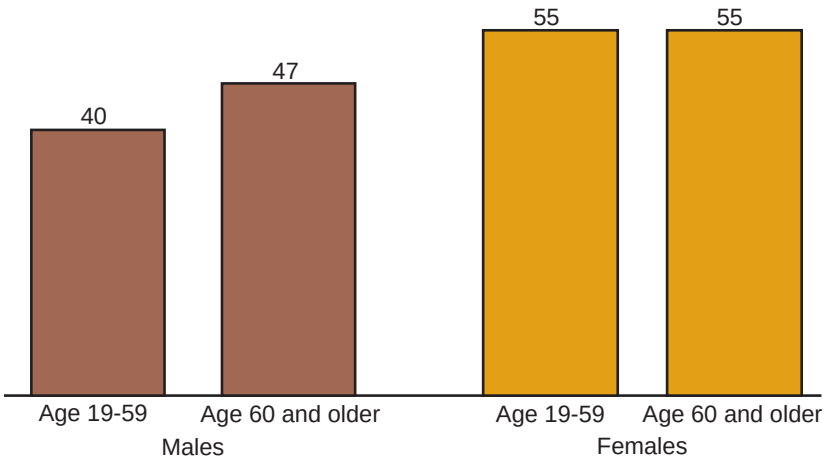
Illness and Low Income May Add Further Nutrition Challenges

As an individual's calorie needs decline, meeting Food Guide Pyramid recommendations becomes increasingly difficult, particularly for older women, who generally have lower energy needs and intakes than older men. Many of the elderly also face other nutritional challenges. Many older individuals suffer from chronic health conditions that may complicate nutrition needs and may require dietary modifications. In a previous analysis of CSFII 1994-96 data, we found that almost half of all older Americans reported suffering from high blood pressure. Substantial numbers of the elderly also reported suffering from diabetes, high blood cholesterol, and cardiovascular disease. Despite this high prevalence of nutrition-related chronic conditions, only about one-quarter of the elderly reported following a special diet. Why more elderly are not changing their diets to combat these health conditions is not known. In 2002, the Medicare system began to reimburse nutrition counseling services provided by qualified nutrition professionals to older individuals with diabetes and renal disease. The extent to which such services improve diets of older individuals with these conditions could have important implications for design of nutrition and health services for the elderly.

For many elderly, especially the "oldest old," physical limitations may impair the ability to shop for and prepare nutritious meals (see "America's Older Population" elsewhere in this issue). Programs that deliver groceries to seniors or bring "mobile markets" to senior housing complexes can ease the difficulties in acquiring foods. Congregate and home-delivered meal programs may help those individuals who also have difficulty with food preparation. National meal programs for the elderly are administered by the Administration on Aging of the U.S. Department of Health and Human Services. USDA provides cash allocations and/or commodity foods for these programs through the Nutrition Services Incentive Program. USDA also supports provision of healthful meals and snacks to participants in adult day care programs through the Child & Adult Care Food Program (CACFP). The adult portion of CACFP, although currently much smaller than the child care segment, is growing rapidly. The number of participating adult day care facilities increased from 1,222 in 1993 to 2,128 in 2001.

Low-income elderly also may face more difficulty in maintaining a nutritious diet. In a previous study, we found that low-income elderly consumed fewer servings of

Figure 1—Older Men Are More Likely To Take Dietary Supplements Than Younger Men



Source: Continuing Survey of Food Intakes by Individuals, 1994-96.

Food Guide Pyramid food groups than higher income elderly. Income limitations, however, might not be the only reason for these difficulties. The low-income segment of the elderly tend to be older, less educated, and more likely to live alone than other elderly—all factors that are also associated with lower diet quality. Despite the need for a nutritious diet, low-income elderly are less likely to participate in USDA's Food Stamp Program than other eligible groups. USDA is making special efforts to reach out to eligible older individuals through Food Stamp Program modifications that may increase the program's appeal for low-income elderly (see "Food Stamp Participation by Eligible Older Americans Remains Low" elsewhere in this issue).

As baby boomers age, the elderly will constitute the largest share of the American population in the Nation's history. These "elderly boomers" may differ in some ways from the elderly of today. For example, they may continue the habit of eating out more frequently, or they may continue to eat less fruit than today's elderly. They will, however, face the same physiological changes as the elderly of today and the same need to make better food choices within increasingly constrained calorie budgets. Their success in making every calorie count should have important implications for their own quality of life. It will also be important to our society, as we are faced with meeting the health and support needs of this large group of older Americans.

References

Guthrie, J.F., and B-H Lin. "An Overview of the Diets of Lower- and Higher-Income Elderly and Their Food Assistance Options," *Journal of Nutrition Education and Behavior*, Vol. 34, Supp. 1, 2002, pp 531-41.

Russell, R.M., H. Rasmussen, and A.H. Lichtenstein. "Modified Food Guide Pyramid for People Over Seventy Years of Age," *Journal of Nutrition*, Vol. 129, 1999, pp. 751-53.

Squires, S. "Medicare Widens Funding for Diet Help," *Washington Post*, January 29, 2002, pp. HE01.

U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Nutrition and Your Health: Dietary Guidelines for Americans*, 5th Edition, Home and Garden Bulletin No. 232. U.S. Department of Agriculture, 2000. **FR**

Food Spending and the Elderly

J. Michael Harris and Noel Blisard

In the next decade and beyond, significant demographic changes—especially the rising number of elderly—will offer new challenges for the U.S. food industry. Elderly people generally eat lesser amounts than energy-burning teens and young adults. Today's elderly also dine out less frequently than their younger counterparts. If these eating and spending patterns continue and America's older population meets growth expectations, growth in real per capita food expenditures will likely stagnate.

Analyses of food spending patterns in 1997 revealed that households with heads age 65-74 spent $41.44 per capita weekly on food, more than the $36.21 spent by households with heads age 75 and older but less than households with 45-64 year-old heads. Households with heads between age 65 and 74 spent more on cereal and cereal products, dairy products, poultry, and processed vegetables than other age groups, while the older elderly spent more on fruit and nonalcoholic beverages. Weekly away-from-home food expenditures for households with heads age 65-74 were $13.04 per capita, less than all age groups except the older elderly and households headed by adults younger than 25.

The U.S. Bureau of the Census projects the number of elderly (people age 65 and older) will grow over 50 percent between 2001 and 2020, while the total U.S. population will grow only 17 percent over the same period. In 2020, about 17 percent of the U.S. population will be over age 65, compared with about 12 percent in 2001. By 2030, the projected elderly population will reach 20 percent of the U.S. population. The "graying" of America makes analysis of expenditure patterns by the elderly increasingly important.

Households with heads age 75 and older spent nearly three-quarters of their weekly food expenditures on at-home foods. Away-from-home food expenditures by this age group were 30 percent lower than the average of all households.

Credit: Ken Hammond, USDA.

In the next two decades, aging baby boomers will create a growing number of younger elderly persons who may have different tastes and food preferences than the older elderly due to differences in educational levels, marital status, gender ratios, race, ethnicity, economic resources, attitudes, and values. Most previous studies of food expenditures have treated elderly consumers age 65 and older as a homogeneous group. USDA's Economic Research Service (ERS) has examined food expenditure patterns of the elderly in general, as well as expenditure differences between the younger elderly (age 65-74) and the older elderly (age 75 and older). Initial growth in the elderly population will be concentrated in the younger category of elderly households, which makes comparisons of expenditures by the younger group with the older group valuable to marketers, policymakers, and researchers.

To analyze elderly food expenditure patterns, we used the Bureau of Labor Statistics' 1997 Continuing Expenditure Survey (CES), particularly the diary survey component of the CES, which includes interviews of 3,000-5,000 house-

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holds conducted every 3 months over a 1-year period. The diary survey obtains data on small, frequently purchased items normally difficult to recall, including foods and beverages. The survey typically collects 2 weeks of data, although some households report only 1 week. Households that reported only 1 week of expenditures were eliminated. Out of 5,149 households that reported 2 weeks of purchases in 1997, 1,075 households were headed by persons age 65 and older—588 were headed by persons age 65-74, and 487 were headed by persons age 75 and older. We examined three aggregate food categories—total food, food at home, and food away from home—and 17 individual food at home categories.

The Elderly Spend Less on Away-From-Home Foods

We first looked at average food expenditures by the elderly and contrasted them with expenditures by other age groups. Households with heads age 75 and older spent an average of $36.21 per capita per week for food, less than the $41.44 for those age 65-74 but higher than households with heads younger than age 45 (table 1). Both elderly groups spent between 8 and 10 percent of their average weekly income on food, compared with an average of 5 percent for all households. The proportion of income spent for food by household heads under age 25 was 9 percent, while the 35-44 age group spent 4 percent of its income on food.

Nearly 73 percent of weekly food expenditures for the oldest group was spent on at-home food. Away-from-home food expenditures for those over age 75, at $9.89 per capita per week, were 30 percent lower than the average of all households and 23 percent lower than the 65-74 age group. Households with heads age 45-54 spent $17.12 per capita per week eating out, the highest amount, followed by those age 25-34, who spent $14.91 per capita per week.

Households in both elderly groups spent more per capita on nonalcoholic beverages than on any of the other 16 individual food cat-

Table 1—Food Expenditures Peak During High Earning Years

Item	All households	Age of household head						
		<25	25-34	35-44	45-54	55-64	65-74	75+
				Number				
Households	5,149	376	928	1,144	959	667	588	487
Average size	2.57	1.98	2.89	3.34	2.81	2.18	1.85	1.51
				Years				
Average age of household head	48	21	30	39	49	59	69	81
				Number				
Persons over age 64	.31	.01	.02	.02	.04	.09	1.38	1.33
Children under age 18	.71	.52	1.12	1.43	.63	.17	.09	.02
				Dollars				
Annual pre-tax income	39,926	15,666	40,247	48,788	55,260	41,734	27,492	19,425
Weekly per capita food expenditures	37.97	28.01	34.85	35.62	42.67	43.40	41.44	36.21
Food away from home	14.20	12.80	14.91	14.20	17.12	13.96	13.04	9.89
Food at home	23.77	15.20	19.94	21.42	25.56	29.44	29.39	26.31
Cereal and cereal products	1.29	.95	1.19	1.19	1.32	1.45	1.50	1.35
Bakery products	2.50	1.60	2.19	2.19	2.72	3.06	3.00	2.84
Dairy products	2.62	1.81	2.60	2.60	2.72	3.09	3.14	2.90
Beef	1.72	1.44	1.53	1.53	2.03	2.06	1.97	1.64
Pork	1.27	.66	1.06	1.06	1.46	1.75	1.57	1.56
Poultry	1.17	.72	1.10	1.10	1.25	1.38	1.51	1.15
Fish and seafood	.76	.35	.65	.65	.91	1.04	.90	.76
Other meats	.78	.47	.75	.75	.81	1.02	.99	.81
Eggs	.28	.20	.22	.22	.29	.35	.36	.36
Fats and oils	.70	.34	.56	.56	.70	.94	.89	.87
Fresh fruits	1.37	.85	1.09	1.09	1.32	1.72	1.80	2.12
Processed fruits	.89	.54	.74	.74	.93	1.08	1.14	1.17
Fresh vegetables	1.24	.58	1.02	1.02	1.36	1.70	1.70	1.47
Processed vegetables	.66	.37	.57	.57	.73	.83	.84	.73
Nonalcoholic beverages	4.12	1.85	3.50	3.50	4.36	5.38	5.01	5.44
Sugar and other sweets	1.01	.54	.87	.87	1.10	1.37	1.34	1.01
Miscellaneous prepared foods	3.43	2.43	3.32	3.32	3.61	4.04	3.44	3.59

Source: Bureau of Labor Statistics' 1997 Continuing Expenditure Survey.

Food expenditures differed significantly among elderly households in rural and urban areas. For all elderly, rural households spent less on total food, at-home food, away-from home food, and five categories of at-home food.

Credit: PhotoDisc.

egories (which was also true for households with heads between age 25 and 64). For elderly households and households with heads age 25-64, weekly per capita expenditures for miscellaneous prepared foods were second highest and dairy products were third.

Spending Differences Exist for Eight At-Home Categories

We tested for significant expenditure differences between the two elderly groups. The differences are based on age, independent of differences in income and other socioeconomic factors. Households with heads age 65-74 and households with heads age 75 and older spent significantly different amounts for total food, food at home, and food away from home, as well as for eight individual at-home food categories. The older elderly group spent less on total food, food at home, and food away from home than the younger group.

The largest differences in at-home food spending were for sugar and other sweets, poultry, and nonalcoholic beverages (table 2). The older group (age 75 and older) spent $0.94 per capita per week less on sugar and other sweets, $0.81 less on poultry, and $0.80 less on nonalcoholic beverages than those age 65-74. The older group also spent less on dairy products, processed and fresh vegetables, and bakery products. However, the older group spent $0.68 more for fresh fruits. Expenditures for the other individual food categories—cereal and cereal products, beef, pork, fish and seafood, other meats, eggs, fats and oils, processed fruits, and miscellaneous prepared foods—did not differ statistically between the two elderly groups.

Effects of Socioeconomic Factors Vary

We estimated the effect of seven socioeconomic characteristics on food expenditures for all households age 65 and older and for the two elderly groups separately when statistically significant differences existed. The socioeconomic factors include income, family size, region of residence, rural versus urban, education level, race, and marital status.

The impact of these characteristics on expenditure patterns for foods and beverages by the elderly were mixed and varied. While region of residence, education level, and marital status had more significant effects on more food expenditure categories for all households with heads age 65 and older, these factors and the remaining factors had fewer significant effects on the two separate elderly groups. Region and education had the greatest impact on expenditures for individual at-home food categories for the two separate elderly groups.

Income

Yearly pre-tax income for all households in the survey averaged $39,926, including wages, dividends, pensions, and cash assistance provided by the Government. Yearly income was $27,492 for the younger elderly group and $19,425 for the older group. Average income for the under-25 group was lower than the oldest group at $15,666 per year. The 45-54 age group had the highest average yearly income, $55,260.

Income had a significant and positive effect on expenditures for most aggregate and individual food categories for people age 65 and older. Estimated income elasticities (the percent change in expenditures given a 1-percent change in income) for all elderly were 0.12 for food at home and 0.16 for food away from home. The largest income effects among individual categories were for fish and seafood (0.36), beef (0.21), and sugar and other sweets (0.13). We found no relationship between income and expenditures for cereal and cereal products, poultry, eggs, and fats and oils.

Income had more significant impacts on expenditures for aggregate and individual food categories for the age 75 and older group than for the age 65-74 group (where significant spending differences existed between the two groups). Income had a significant effect on seven of the individual food expenditure categories for the oldest group but only four categories for the younger elderly group. In general, income effects were relatively small for most individual food categories.

Family size

Family size had very little statistical effect on expenditures, possibly because most elderly households consist of either one or two people. However, family size had significant effects on two aggregate food categories and two individual food categories. For each additional person in households with heads age 65 and older, per capita per week food expenditures decreased $2.97. Interestingly, for the 65-74 age group, per capita food expenditures decreased $3.90 for each person added to the household.

For food at home, per capita expenditures decreased $3.45 when a person was added to a household in the oldest age group, while expenditures for the younger elderly group decreased $3.84 for each additional person. Bakery products and fresh fruit were the only individual food categories where family size had an impact on expenditures but only for the 65-74 age group. Expenditures on bakery products decreased $0.21 for all elderly and

$0.37 for the 65-74 age group for each person added to a household. Expenditures for fresh fruit decreased $0.41 for each additional person in the 65-74 age group.

Region of residence

The effects of region of residence on elderly food expenditures were measured relative to expenditures in the Midwest. Regional differences may exist due to differing tastes and preferences and/or differences in regional prices. At-home food expenditures for all elderly households were higher in the Northeast ($3.29 per capita per week) than in the Midwest. In contrast, away-from-home food expenditures for all elderly households were significantly lower for the Northeast, West, and South, compared with the Midwest.

Away-from-home food expenditures for the 65-74 age group were lowest in the West ($5.08) and the South ($8.47), compared with the Midwest. Per capita weekly expenditures for households with heads age 75 and older were $4.95 lower in the West than the Midwest.

Ten individual food categories displayed varied degrees of regional effects on food expenditures. Elderly households in the Northeast, West, and South had markedly higher expenditures for fish and seafood than elderly households in the Midwest. Elderly households in the Northeast spent more on poultry than elderly households in the Midwest. Elderly households in the West spent $1.26 per capita per week less on pork than elderly households in the Midwest.

Rural versus urban

Significant differences in elderly food expenditures were found for rural households relative to urban households. For all elderly, rural households spent $7.63 per capita per week less for total food, $4.27 less for food at home, and $5.56 less for food away from home than urban households. For the 65-74 age group, rural households spent less for total food. Rural households with heads age 75 and older spent less for all three aggregate food categories than their urban counterparts.

All elderly rural households (age 65 and older) spent less per capita per week than their urban counterparts for five individual food categories: bakery products ($0.54), fresh fruits ($1.96), fresh vegetables ($0.58), processed vegetables ($0.35), and miscellaneous prepared foods ($1.41). In separating the two age groups, the 65-74 rural age group spent $1.96 per capita per week less on fresh fruits than the urban group. In the 75-and-older group, rural households spent $3.10 per capita per week less on fresh fruit and $0.83 less for fresh vegetables.

Education level

Education, measured in years of formal schooling, also had a significant effect on expenditures by elderly households. Expenditure differences were measured relative to households with heads holding high school degrees. For all elderly, households with heads with postgraduate education (more than 4 years of college) spent more for total food per capita ($13.74), at-home food ($5.65), and away-from-home food ($12.05) than those with heads holding high school degrees. Households with heads holding postgraduate degrees also spent more on nine individual food categories and less on two.

For the individual elderly groups, those households with heads age 65-74 with postgraduate degrees spent more than households with heads holding high school degrees for total food ($18.80), food at home ($11.28), food away from home ($13.10) and six individual food categories. Households with heads holding college degrees in this younger age group spent more on sugar and other sweets and on bakery products and less on nonalcoholic beverages. In the 75-and-older age

Table 2—Significant Differences in Food Expenditures Exist Due to Age

Category	Statistically estimated differences in weekly per capita expenditures between older elderly (age 75 and older), compared with younger elderly (age 65-74)
	Dollars
Total food	-5.99
Food away from home	-5.49
Food at home	-2.65
Cereal and cereal products	None
Bakery products	-.38
Dairy products	-.52
Beef	None
Pork	None
Poultry	-.81
Fish and seafood	None
Other meats	None
Eggs	None
Fats and oils	None
Fresh fruits	.68
Processed fruits	None
Fresh vegetables	-.42
Processed vegetables	-.21
Nonalcoholic beverages	-.80
Sugar and other sweets	-.94
Miscellaneous prepared foods	None

Source: USDA's Economic Research Service estimates based on Bureau of Labor Statistics' 1997 Continuing Expenditure Survey.

group, households with heads with postgraduate degrees spent $10.23 more per capita per week for away-from-home food and $1.25 more for dairy products.

Race

Elderly Black households spent $9.11 less per capita per week for total food and $13.13 less for away-from-home food, compared with elderly non-Black households. Elderly Blacks spent $2.66 more for fish and seafood, $2.60 more for pork, and $2.18 more for poultry than elderly non-Blacks. Elderly Black households also spent less for miscellaneous prepared foods, bakery products, and dairy.

After splitting the elderly into two age groups, we found that Blacks age 65-74 spent $10.26 less for away-from-home food, $1.07 less for bakery products, and $2.18 less for poultry. Within the older elderly group, Blacks spent $13.98 less per capita per week for total food and $16.49 less for away-from-home food. Black households with heads over age 75 spent less for dairy, bakery products, and fresh vegetables.

Marital status

Marital status also played a role in the level of elderly food expenditures. For all elderly households, households headed by an unmarried male spent $8.48 per capita per week more on total food, compared with households with a married couple. Households headed by unmarried females spent $5.88 less and households headed by unmarried males spent $9.16 more on away-from-home food than households headed by married couples. Households headed by unmarried females spent less in seven individual food categories but more on fresh fruits. Households headed by unmarried males spent less per capita per week than households headed by married couples in six categories, including beef ($1.73), fish and seafood ($1.58), and fats and oil ($1.23), and more for sugar and other sweets ($1.55).

Within the 65-74 age group, households headed by unmarried females spent $8.79 less per capita per week on total food, $10.12 less on away-from-home food, and less on three individual food categories than their married counterparts. Households headed by unmarried males spent $8.52 more on away-from-home food, $1.71 more for nonalcoholic beverages, $0.98 more for fresh vegetables, and less for sugar and other sweets, fresh vegetables, poultry, bakery, and processed vegetables than their married counterparts.

Within the 75-and-older age group, households headed by unmarried males spent $12.63 more for total food and $11.29 more for away-from-home food than households headed by married couples. No significant differences were found for individual food categories in this age group.

Over the next 20 years, when today's baby boomers are in their mid-sixties and early seventies, the number of people in the United States age 65-74 will grow from 18.2 million to 31.5 million. At the same time, 22.3 million Americans will be over age 75. Our analysis of food spending patterns in 1997 found that at-home food accounted for 73 percent of the food expenditures by households with heads over age 75. Away-from-home food expenditures by households with heads over 75 were 30 percent lower than all U.S. households and 23 percent lower than households with heads age 65-74.

Households with heads between age 65 and 74 spent more on cereal and cereal products, dairy products, poultry, and processed vegetables than households with heads in other age groups. Households headed by the older elderly group spent more than households headed by any other age group on fresh and processed fruits and nonalcoholic beverages. Income had significant, positive effects on most elderly food expenditure categories. Region of residence, education, and marital status had the greatest impacts among the other socioeconomic factors on food expenditures by both elderly groups.

If tomorrow's elderly eat like their predecessors, we expect U.S. per capita food expenditures to stagnate as the population ages. While real total food expenditures (in 1997 dollars) will continue to grow with increasing population, real per capita expenditures are likely to stagnate because the elderly tend to eat lesser amounts of food than teens and younger adults and eat out less often.

To meet the needs of the increasing elderly population in the United States, food industry marketers and policymakers should pay close attention to the expenditure patterns of the elderly and the differential impacts of socioeconomic factors on food spending by the elderly. Public programs, product development, and marketing will need to adjust to accommodate the changing food spending patterns of the elderly population.

References

Abel-Ghany, Mohamed, and Deana L. Sharpe. "Consumption Patterns Among the Young-Old and Old-Old," *Journal of Consumer Affairs,* 1997, Vol. 31, No. 1, pp. 90-112.

Harris, J. Michael, and Noel Blisard. *Elderly Food Expenditure Patterns*, Agricultural Economic Report, U.S. Department of Agriculture, Economic Research Service, forthcoming. **FR**

Food Security Rates Are High for Elderly Households

Mark Nord

Households that include elderly persons are generally more food secure than other U.S. households. However, not all elderly persons have achieved food security—access at all times to enough food for an active, healthy life for all household members. Analysis by USDA's Economic Research Service (ERS) of data from a nationally representative food security survey conducted in September 2000 shows that 94 percent of households with an elderly person (age 65 or older) present were food secure throughout the year. The remaining 6 percent of households with elderly were food insecure. At some time during the previous year, these households were uncertain of having, or unable to acquire, enough food to meet basic needs of all their members because they had insufficient money or other resources for food (see box).

One in four of the food-insecure elderly households (1.5 percent of all elderly households) were food insecure to the extent that one or more household members were hungry, at least some time during the year, because they could not afford enough food. The other three-fourths of food-insecure elderly households obtained enough food to avoid hunger by using a variety of coping strategies, such as eating less varied diets, participating in Federal food assistance programs, or getting emergency food from community food pantries. These rates of food insecurity and hunger among elderly households were

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The high proportion of elderly that own their own homes and have substantial financial assets is a likely factor in the higher rates of food security among this age group.

Credit: Ken Hammond, USDA.

about half those of households with no elderly members.

Elderly households registered nearly identical rates of food insecurity and hunger in 1999 and 2000. Two-year average rates for 1999-2000 are reported in the remainder of this article to increase the reliability of the statistics, especially as pertains to smaller subpopulations of the elderly.

Elderly Are More Food Secure Than Nonelderly

The lower rate of food insecurity of elderly households compared with nonelderly households is, in part, a result of a lower poverty rate among the elderly. Food insecurity is, by definition, a condition that results from constrained resources, and the elderly have, for several decades, registered lower rates of poverty than the nonelderly. In 2000, for example, the U.S. Census Bureau reported a poverty rate of 10.2 percent for people age 65 and older, compared with 11.4 percent for people under age 65. (Poverty and income statistics reported in this article take into account all cash income, including Social Security benefits.)

Lower poverty rates, however, account for only a small part of the low rate of food insecurity among the elderly. At all income levels, food insecurity was much less prevalent among households consisting entirely of elderly persons than among households with no elderly persons (fig. 1). Food insecurity rates for mixed-age households—those with both elderly and nonelderly present—fell between those of the other two groups. The prevalence of food insecurity with hunger—the more severe range of food insecurity—followed a similar pattern except that rates for mixed-age households were nearer those of households consisting entirely of elderly persons (fig. 2).

More stable income probably contributes to the higher rates of food security among the elderly compared with other age groups. ERS research shows that irregular income, and especially sudden drops in income, contributes to food insecurity. Social Security and pensions provide relatively stable income for many elderly persons. Also, as reported by the Institute for Research on Poverty, a larger proportion of elderly than nonelderly own their own homes and have substantial financial assets. Thus, the elderly have more of their income available for food, and they are better able to smooth

How Does USDA Measure Food Security?

USDA monitors the food security of the Nation's households through annual, nationally representative food security surveys. The surveys are conducted for USDA by the U.S. Census Bureau as an annual supplement to the Bureau's monthly Current Population Survey (CPS)—the same survey that provides data for the Nation's monthly unemployment statistics and annual poverty rates. A nationally representative sample of about 40,000 households responds to CPS questions about food expenditures, use of Federal and community food assistance programs, and whether they are able to consistently meet their food needs.

Each household's food security status is assessed by a series of 18 questions about behaviors and experiences known to characterize households that are having difficulty meeting their food needs. The questions cover a wide range of severity of food insecurity. For example, questions at the least-severe level of food insecurity ask whether respondents worried that their food would run out before they got money to buy more and whether they were able to afford to eat balanced meals. Questions at the midrange ask about reductions in food intake, such as whether adults in the household cut the size of meals or skipped meals because there wasn't enough money for food. Questions tapping the more severe levels of food insecurity ask whether children skipped meals because there wasn't enough money for food, and whether adults did not eat for a whole day because there was not enough money for food. Each question asks whether the condition or behavior occurred during the previous 12 months and specifies a lack of money or other resources to obtain food as the reason for the condition or behavior. Voluntary fasting or dieting to lose weight is thereby excluded from the measure.

Interviewed households are classified into one of three categories—food secure, food insecure without hunger, food insecure with hunger—based on the households' responses to all items. Households that answer yes to 3 or more of the 18 food security questions are classified as food insecure. At a minimum, food-insecure households have affirmed all of the following three items or items indicating more severe conditions:

- They worried whether their food would run out before they got money to buy more.
- The food they bought didn't last, and they did not have money to get more.
- They could not afford to eat balanced meals.

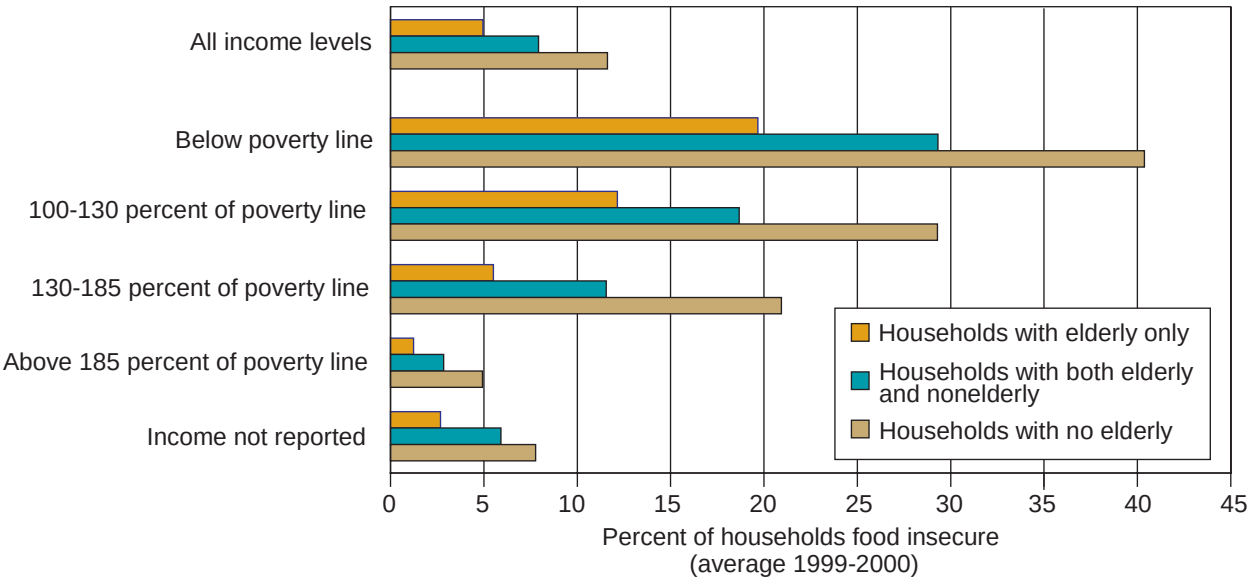
Households classified as food insecure with hunger have affirmed, in addition to the three items above, both of the following items or items indicating more severe conditions:

- Adults ate less than they felt they should.
- Adults cut the size of meals or skipped meals in 3 or more months.

their consumption if income or other needs fluctuate.

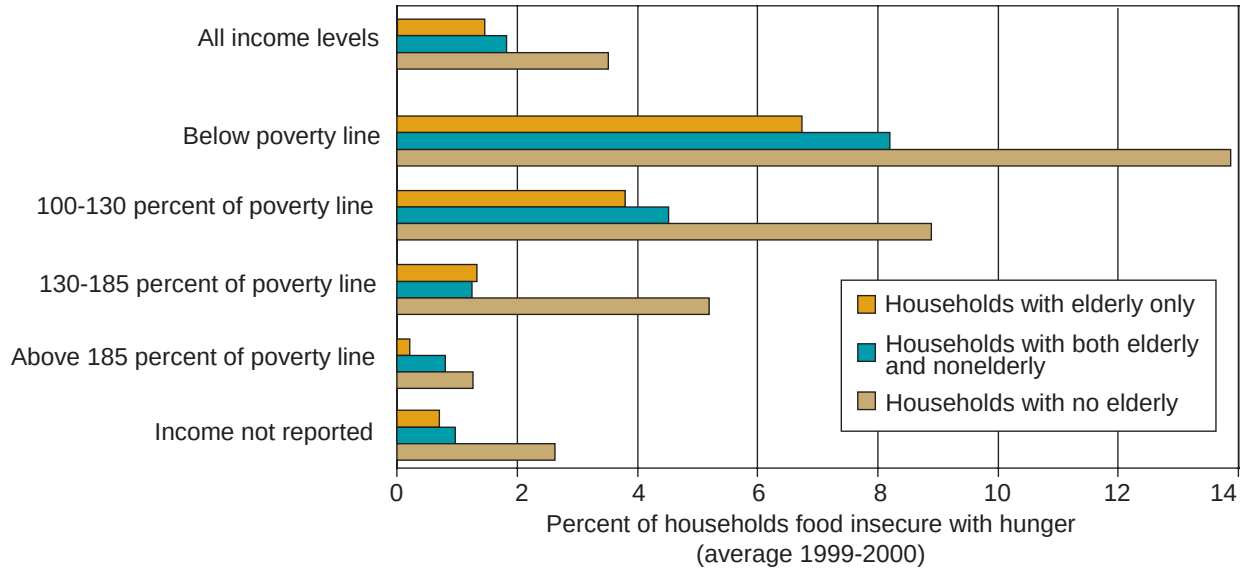
Rates of food insecurity and hunger among households consisting entirely of elderly persons remained almost unchanged from 1995, when the first nationally representative food security survey was conducted, through 2000 (fig. 3). Over the same period, the food security of nonelderly households improved steadily as incomes rose with economic growth. Elderly persons generally depend less on the labor market for their income than nonelderly persons. As a result, the incomes of elderly persons, especially the lower income elderly, who are more vulnerable to food insecurity, are not affected much by changes in the economy.

Figure 1—Elderly Are More Food Secure at All Income Levels



Note: Income categories are based on all cash income, including social security benefits.
Source: Prepared by USDA's Economic Research Service based on data from April 1999 and September 2000 Current Population Survey Food Security Supplements.

Figure 2—Prevalence of Hunger Is Lower Among Elderly at All Income Levels



Note: Income categories are based on all cash income, including Social Security benefits.
Source: Prepared by USDA's Economic Research Service based on data from April 1999 and September 2000 Current Population Survey Food Security Supplements.

Elderly Couples Were Most Food Secure

Rates of food insecurity and hunger among elderly households depended to a considerable extent on household composition, household income, race and ethnicity, and area of residence. Households consisting of two or more elderly persons—almost all of them married couples—were by far the most food secure. Only 2.4 percent of such households were food insecure, and 0.6 percent were food insecure with hunger (table 1). Rates of food insecurity were higher among elderly men living alone (6.9 percent) and elderly women living alone (6.6 percent) and higher still for mixed-age households (7.9 percent). All of these rates, however, were well below those of households with no elderly members (11.6 percent).

Food security is strongly related to income. The rate of food insecurity among elderly households with incomes below the Federal poverty line was 22.6 percent—more than 12 times that of elderly households with incomes above 185 percent of the poverty line. Hunger resulting from food insecurity was even more strongly associated with income, measuring 7.2 percent for elderly households with incomes below the poverty line and 0.4 percent for elderly households with incomes above 185 percent of the poverty line.

Food insecurity and hunger were more common among Black and Hispanic elderly than among non-Hispanic White elderly. Rates

Table 1—Prevalence of Food Insecurity and Hunger Is Much Lower for Elderly Couples Than for Elderly Men or Women Living Alone

Category	Total number of households[1]	Food secure	Food insecure		
			All	Without hunger	With hunger
	Thousands	*Percent*			
Households with no elderly person present[2]	80,548	88.4	11.6	8.1	3.5
Households with elderly person present[2]	24,815	94.1	5.9	4.4	1.5
Household composition (households with elderly):					
Elderly men living alone	2,324	93.1	6.9	4.6	2.3
Elderly women living alone	7,763	93.4	6.6	4.7	1.9
Two or more elderly living together	6,975	97.6	2.4	1.8	.6
Elderly living with nonelderly	7,754	92.1	7.9	6.1	1.8
Household income (households with elderly):					
Below poverty line	2,414	77.4	22.6	15.4	7.2
Between 100 and 130 percent of poverty line	1,821	86.1	13.9	9.9	4.0
Between 130 and 185 percent of poverty line	3,769	93.1	6.9	5.6	1.3
Above 185 percent of poverty line	11,498	98.2	1.8	1.4	.4
Income not reported	5,313	96.4	3.6	2.8	.8
Race/ethnicity (households with elderly):					
White non-Hispanic	20,530	96.3	3.7	2.8	.9
Black non-Hispanic	2,315	81.1	18.9	12.7	6.2
Hispanic[3]	1,324	84.6	15.4	12.0	3.4
Other non-Hispanic	646	91.8	8.2	6.5	1.7
Area of residence (households with elderly):					
Inside metropolitan area	19,151	94.1	5.9	4.4	1.5
In central city[4]	5,907	91.2	8.8	6.5	2.3
Not in central city[4]	9,707	96.0	4.0	3.0	1.0
Outside metropolitan area	5,664	94.2	5.8	4.2	1.6
Census geographic region (households with elderly):					
Northeast	5,303	94.3	5.7	4.1	1.6
Midwest	5,878	96.1	3.9	3.0	.9
South	8,883	92.2	7.8	5.6	2.2
West	4,751	95.1	4.9	3.7	1.2

[1]Totals exclude households for which food security status is unknown because they did not give a valid response to any of the questions in the food security scale. In 1999 and 2000, these represented 0.4 percent of households with elderly present.
[2]"Elderly" refers to persons age 65 and older.
[3]Hispanics may be of any race.
[4]Metropolitan area subtotals do not add to metropolitan area totals because central-city residence is not identified for about 17 percent of households in metropolitan statistical areas.
Source: Calculated by USDA's Economic Research Service using data from the April 1999 and September 2000 Current Population Survey Food Security Supplements.

Meals on Wheels and other community food assistance programs that deliver prepared meals to homes help supplement the food resources of elderly households coping with food insecurity.

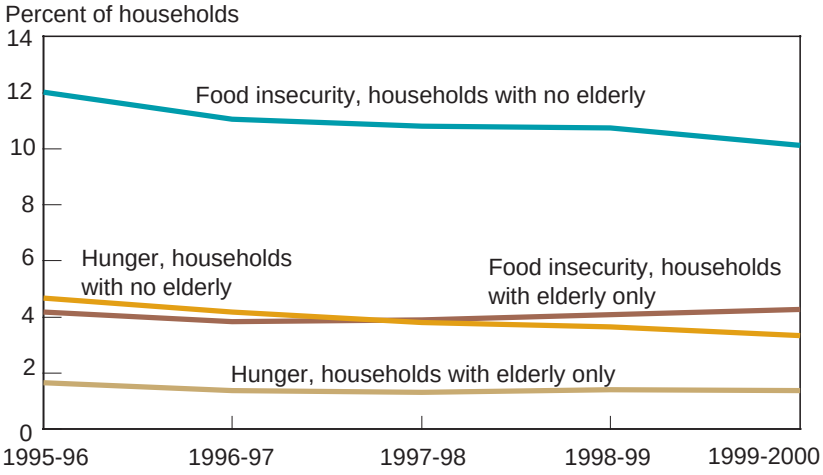
Credit: Ken Hammond, USDA.

of food insecurity were 18.9 percent for Black elderly households, 15.4 percent for Hispanic elderly households, and 3.7 percent for non-Hispanic White elderly households. About half of these differences can be accounted for by the lower incomes and higher poverty rates among the minority households and by the smaller proportion of minority elderly who live in married-couple households and the larger proportion who live in mixed-age households.

Elderly living in the central cities of metropolitan areas were about twice as likely to be food insecure, and food insecure with hunger, as those living elsewhere within metropolitan areas, such as in suburban areas and other less densely populated urban areas. Elderly households located outside metropolitan areas registered rates of food insecurity and hunger between those of the two metropolitan categories. Food insecurity and hunger were more prevalent among elderly living in the South than among elderly living in other regions.

Most elderly survey respondents who reported food access problems said that these problems were due to lack of income and other resources for food. A small proportion reported other food access problems serious enough to disrupt normal eating patterns or reduce food intake. For example, 3 percent said they did not always have the kinds of food they wanted to eat or did not have enough to eat because it was too hard to get to the store (table 2).

Figure 3—Economic Growth Had Little Effect on Food Security of the Elderly, But Improved Food Security of Nonelderly



Note: Two-year averages are presented to provide more reliable estimates and to smooth year-to-year fluctuations related to the season in which the survey was conducted. "Elderly" refers to persons age 65 and older. Data were adjusted for differences in screening procedures to be comparable in all years. This results in lower rates of food insecurity and hunger than those reported elsewhere in the article.
Source: Prepared by USDA's Economic Research Service based on Current Population Survey Food Security Supplement data.

How the Elderly Cope With Food Insecurity

When faced with limited money or other resources, some elderly households supplement their food resources through Federal or community food assistance programs. Food programs used most frequently by the elderly are the Food Stamp Program, Meals on Wheels and similar services that deliver prepared meals to the home, senior

Table 2—A Small Proportion of Elderly Households Reported Other Food Access Problems Serious Enough To Affect Food Choice or Reduce Food Intake

Condition[1]	Percentage of all elderly households reporting the condition (average 1999-2000)
Did not always have the kinds of food they wanted to eat or did not have enough to eat:	
Because they did not have time for shopping or cooking	1.7
Because it was too hard to get to the store	3.1
Did not have enough to eat:	
Because they had no working stove	.1
Because they were not able to cook or eat because of health problems	.3

Note: "Elderly households" refers to households with one or more members age 65 or older.
[1]Survey respondents were first asked to describe the food situation in their household in one of four categories. If they indicated that they sometimes or often did not have enough to eat, or that they did not always have the kinds of food they wanted to eat, they were presented with a list of possible reasons from which they selected all that were applicable.
Source: Calculated by USDA's Economic Research Service using data from the April 1999 and September 2000 Current Population Survey Food Security Supplements.

Table 3—Forty Percent of Low-Income Food-Insecure Elderly Households Received Food Stamps, Senior Meals, or Food From a Food Pantry

Food assistance program	Percentage of low-income food-insecure elderly households using the program (average 1999-2000)
Food Stamp Program (during previous 12 months)	26.2
Senior meals (either delivered to home or in a center, during previous month)	10.9
Food pantry (during previous 12 months)	15.0
One or more of the three programs	39.6
None of the three programs	60.4

Note: "Elderly households" refers to households with one or more members age 65 or older. "Low-income" refers to households with annual incomes below 185 percent of the poverty line. Most households with incomes higher than that level were not asked about use of these food resources. Some households were not eligible for the Food Stamp Program, for which monthly income must be below 130 percent of the poverty line.
Source: Calculated by USDA's Economic Research Service using data from the April 1999 and September 2000 Current Population Survey Food Security Supplements.

meals provided at a community center or senior center, and community food pantries.

Forty percent of food-insecure elderly households reported using one or more of these Federal or community food assistance resources (table 3). Twenty-six percent of food-insecure elderly households received food stamps; 11 percent received meals, either delivered to their homes or in community centers or senior centers; and 15 percent received emergency food from food pantries, food banks, or similar community food programs. For the elderly who seek food assistance, community food programs largely substitute for, rather than supplement, the Food Stamp Program. Among elderly households that got food either from senior meals programs or from a food pantry, only 34 percent also received food stamps. Similarly, of those that got food stamps, only 28 percent also got food from community food programs.

Food security is one of several necessary conditions for a population to be healthy and well nourished. The prevalence of food security among the elderly in the United States is high, thanks to stable incomes provided by Social Security, pensions, and personal savings, and to national and community food assistance programs. Nevertheless, some work remains to assure that all elderly have access at all times to enough food for active healthy lives. USDA's food security monitoring and research program provides information to guide this work.

References

Dalaker, Joseph. *Poverty in the United States: 2000*, Current Population Reports, P60-214, U.S. Census Bureau, 2001.

Gundersen, Craig, and Joseph Gruber. "The Dynamic Determinants of Food Insufficiency," in Andrews, Margaret, and Mark Prell (eds.), *Second Food Security Measurement and Research Conference, Volume II: Papers,* Food Assistance and Nutrition Research Report 11-2, U.S. Department of Agriculture, Economic Research Service, August 2001.

Haveman, Robert, and Edward N. Wolff. *Who Are the Asset Poor?: Levels, Trends, and Composition, 1983-1998,* Discussion Paper No. 1227-01, Madison, Wisconsin: Institute for Research on Poverty.

Nord, Mark, Nader Kabbani, Laura Tiehen, Margaret Andrews, Gary Bickel, and Steven Carlson. *Household Food Security in the United States, 2000,* Food Assistance and Nutrition Research Report No. 21, U.S. Department of Agriculture, Economic Research Service, March 2002.

Nord, Mark, and Margaret Andrews. *Reducing Food Insecurity by Half in the United States: Assessing Progress Toward a National Objective,* Food Assistance and Nutrition Research Report No. 26-2, U.S. Department of Agriculture, Economic Research Service, May 2002. **FR**

Food Stamp Participation by Eligible Older Americans Remains Low

Parke Wilde and Elizabeth Dagata

For more than 15 years, the Nation's largest food assistance program has confronted a mystery. Although USDA's Food Stamp Program has special provisions to facilitate participation by low-income Americans age 60 and older, only about a third of those eligible in this age group join the program. No other demographic group participates at such a low rate.

The food stamp participation rate—the number of participants as a proportion of the number of eligible people—dropped slightly for older Americans from 1994 to 2000, while the participation rate fell sharply for other age groups (table 1). For people age 60 and older, USDA's Food and Nutrition Service (FNS) estimates that the participation rate was 36 percent in 1994 and 30 percent in 2000. By contrast, the participation rate fell from 74 to 60 percent for nonelderly adults in the same period. For children under age 18, the participation rate also fell, from 90 percent in 1994 to 72 percent in 2000.

An average of 1.7 million Americans age 60 and older received food stamps each month in 1999 and 2000. For households that included participants age 60 and older in 2000, average monthly benefits were $59, compared with average benefits of $158 for all food stamp households. The average benefit is lower for households with older Americans partly because of their smaller family sizes and partly because of their higher per capita income.

Among low-income elderly persons, the share of nonparticipants in the Food Stamp Program that reported being in excellent health was more than double the share of participants reporting this level of health.

Credit: Ken Hammond, USDA.

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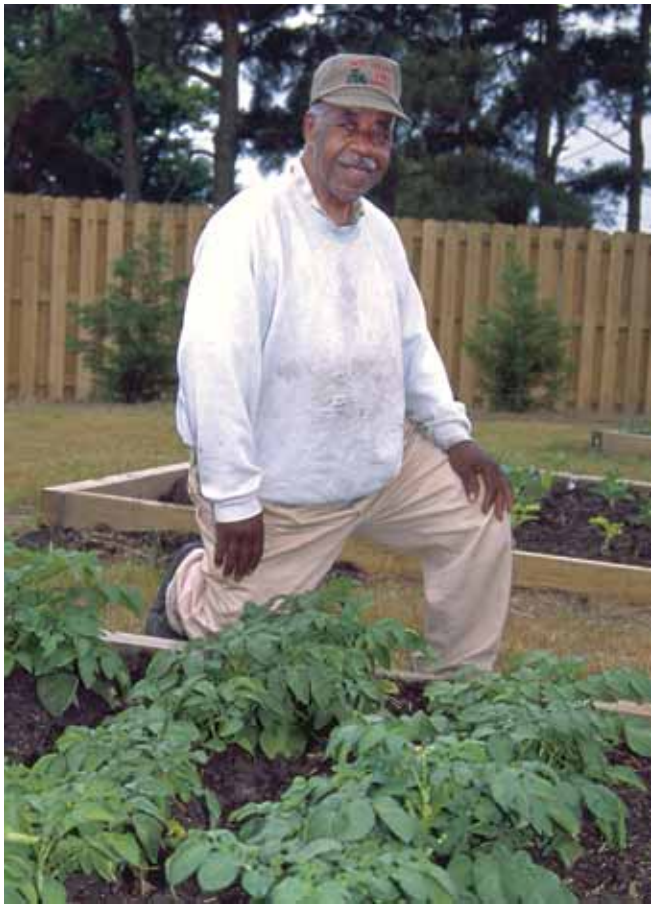
Special Provisions for Older Americans

Following rules established by Congress, the Food Stamp Program extends a special invitation to older Americans. Individuals age 60 and older, or families that include a person this age, face somewhat relaxed income and asset limits for eligibility in the program. For example, to be eligible for food stamp benefits, families without an elderly or disabled member must have monthly cash income no higher than 130 percent of the Federal poverty guideline (the guideline is $1,467 per month for a family of four in 2002). This limit, known as the "gross income test," is waived for families with an elderly or disabled person. The only income limit families with an elderly or disabled person must meet is known as the "net income test," which requires that monthly cash income after certain deductions be no higher than 100 percent of the Federal poverty guideline. The most important deductions are a standard deduction and a shelter deduction for certain housing and utility expenses. Older or disabled participants are also permitted a deduction for

out-of-pocket medical expenses above $35, which is not available to other participants.

To be eligible for food stamps, families with a member age 60 and older face a more lenient limit on the assets they may own ($3,000) than other families ($2,000). As of October 2002, families with a disabled member will also face the more lenient $3,000 asset limit. For all families, these asset limits do not include a family's own home. Households in which all members receive benefits from Supplemental Security Income (SSI), a Federal cash assistance program for the low-income elderly and disabled, are automatically eligible for the Food Stamp Program, without being subject to asset limits at all. These food stamp eligibility requirements seek to provide for the special circumstances of older Americans, such as higher medical costs or assets that are essential savings for old age.



Focus group participants commonly cited pride and the perceived stigma of Food Stamp Program participation as barriers to taking part in the program.

Credit: Ken Hammond, USDA.

Exploring the Mystery of the Missing Elderly

To gain insight into what is keeping older Americans away from the Food Stamp Program, USDA's Economic Research Service (ERS) compared relevant demographic characteristics and income levels of food stamp participants age 60 and older and low-income nonparticipants age 60 and older. ERS used data from the Census Bureau's March 2001 Current Population Survey (CPS) to make the comparison. Both the food stamp participants and the nonparticipants had annual household incomes below 130 percent of the Federal poverty guideline. In 2000, the Federal poverty level was $922 per month for a two-person household. Income includes all sources of cash income, such as earnings, social security, welfare benefits, and interest income, but not in-kind benefits, such as food stamps or most medical program benefits. (The 130-percent criterion does not by itself establish eligibility because some elderly people with incomes lower than 130 percent of poverty may be ineligible due to asset limits and other rules, while others with higher incomes may in fact be eligible if they have substantial deductions.)

The elderly participants and low-income nonparticipants were similar in some respects. About two-thirds of both groups were women (table 2). A slightly higher proportion of the participant group lived in rural areas. The nonparticipating elderly were slightly older than the participating elderly. Median age for nonparticipants was 73, versus 70 for participants.

Elderly Food Stamp Program participants and low-income nonparticipants differed in race, ethnicity, and region of residence. Participants were more likely than nonparticipants to be Black or Hispanic. Almost three quarters (71 percent) of nonparticipants were non-Hispanic Whites, compared with just over half (55 percent) of participants. Nonparticipants were more likely than participants to live in the Midwest and West and less likely to live in the South and Northeast.

Some important differences between these two groups of elderly are their health and food security. Low-income nonparticipants, despite being slightly older than par-

Table 1—Fewer Than a Third of Eligible People Over Age 60 Receive Food Stamps

Fiscal year	Eligible persons, by age (years)			Participants, by age (years)			Participation rate, by age (years)		
	0-17	18-59	60 +	0-17	18-59	60 +	0-17	18-59	60 +
	Millions			*Millions*			*Percent*		
1994	15.0	14.6	5.5	13.5	10.8	1.9	89.6	74.2	35.7
1995	15.0	14.5	5.1	13.0	10.3	1.9	86.8	71.2	36.1
1996	14.4	14.3	5.8	12.3	9.9	1.7	85.6	68.7	29.7
1997	14.0	12.4	5.4	10.6	8.1	1.6	75.7	65.8	29.8
1998	13.4	11.7	5.3	9.4	7.1	1.6	70.7	60.3	30.9
1999	12.7	11.6	5.2	8.7	6.7	1.7	67.9	58.1	32.9
2000	11.9	10.9	5.4	8.5	6.5	1.7	71.8	59.9	30.0

Source: USDA's Food and Nutrition Service.

ticipants, appear to be healthier than participants. Twenty-two percent of nonparticipants reported being in excellent or very good health, while only 10 percent of participants reported this level of health. Participants were more likely to report being in poor health.

Elderly participants were more likely than low-income nonparticipants to be classified as "food insecure," based on their responses to a supplement to the CPS in 1999 and 2000 (see "Food Security Rates Are High for Elderly Households" elsewhere in this issue). Thirty-nine percent of elderly food stamp participants were food insecure, compared with 16 percent of low-income elderly nonparticipants.

These results about health and food security may indicate that those low-income older Americans who face the most severe concerns about their health and food security situation are more likely to take the necessary steps to join the Food Stamp Program. In the case of health status, the referral of disabled and poor elderly to the Food Stamp Program from the SSI program may also play an important role. About 40 percent of elderly food stamp participants also participated in SSI, while only 7 percent of elderly food stamp nonparticipants reported participating in SSI.

Table 2—Elderly Food Stamp Participants Report Lower Rates of Excellent and Very Good Health Than Nonparticipants

	Persons age 60+ with income <= 130 percent of poverty guideline		
Item	All	FS participants	FS nonparticipants
Persons, March 2001 (thousands)	7,742	1,038[1]	6,704
		Percent	
Age:			
60-69	37	48	35
70-79	39	37	39
80-89	20	12	22
90+	4	3	4
Gender:			
Female	66	69	65
Male	34	31	35
Race:			
White, non-Hispanic	69	55	71
Black, non-Hispanic	15	24	14
Hispanic	12	17	11
Other	4	3	4
Residence:			
Rural	28	31	27
Urban	72	69	73
Region:			
Northeast	19	22	19
Midwest	19	14	20
South	44	52	42
West	18	12	19
Health:			
Excellent or very good	21	10	22
Good	30	20	32
Fair	29	35	28
Poor	20	35	18
Food security status:[2]			
Secure	80	61	84
Insecure, without hunger	14	25	12
Insecure, with hunger	6	14	4
Received SSI benefits	12	40	7

Note: FS = Food Stamp Program. SSI = Supplemental Security Income.
[1]The Current Population Survey undercounts the number of elderly food stamp participants. There were 1.7 million elderly food stamp participants on average each month in 2000.
[2]Food security is defined as having access at all times to adequate food for an active, healthy life, and it is measured by asking a series of questions about household experiences of food deprivation.
Source: Current Population Survey (CPS), March 2001; CPS Food Security Supplements, April 1990 and September 2000, U.S. Census Bureau.

Interviews With Elderly Food Stamp Participants

USDA has also sponsored focus group studies to understand the Food Stamp Program experiences of older Americans and the reasons for their low participation rates. In conversations among groups of elderly program participants and eligible nonparticipants in the State of Washington, the most commonly mentioned barrier to participation was pride. As one elderly participant in Seattle explained: "I was from the generation where... no way did you take that stuff. You either worked or you did without it. So I had to get up a lot of courage to just ask (for food stamps)." The interviewers found that pride and the perceived stigma of program participation prevent some seniors from considering the Food Stamp Program as a viable resource.

The next most common barriers, in order of how frequently they were mentioned in these interviews, were misinformation and confusion about the program's eligibility rules, lack of transportation, special issues confronting elderly immigrants, and language barriers. Other frequently mentioned barriers include low benefits, the burdens of applications and administrative requirements, and diffi-

Electronic Benefits Transfer Systems Can Present Challenges for the Elderly

Since USDA began experimenting with Electronic Benefits Transfer (EBT) systems in the early 1980s, there have been concerns that the elderly and the disabled would be uncomfortable with the new technology and reluctant to apply for benefits or use them once EBT systems were put into place. Concerns were expressed regarding the ability and willingness of the elderly to learn how to use the cards and EBT equipment. It was also feared that cognitive issues might prevent elderly participants from remembering their Personal Identification Numbers (PIN) (or trust giving them to authorized representatives) or mastering the new procedures needed to keep track of the amount of benefits remaining in their accounts.

Once EBT systems became operational, other problems became apparent. Since the elderly are likely to receive fewer benefits, some may accumulate the benefits over several months and use them in a single shopping trip or for a big occasion, such as Thanksgiving or other holidays. However, most State EBT systems move benefits to an inactive status if they are not used within 3 months. In such cases, it is not always clear to participants that these benefits can be retrieved. The use of EBT cards has also restricted seniors' ability to use food stamp benefits at congregate meal sites and as payment for home-delivered meals.

Early evaluations of EBT systems did not explore the extent to which the experiences of elderly Food Stamp Program clients might have differed from the average client. A recent EBT evaluation sponsored by USDA's Economic Research Service (ERS) at the request of USDA's Food and Nutrition Service found that elderly and disabled food stamp recipients had more problems remembering their PIN, using the EBT system, and using their EBT cards than nonvulnerable groups. These problems appeared to be greatest for new recipients. Elderly and disabled recipients, like other new EBT users, had fewer problems in subsequent months as they gained experience dealing with the system. The evaluation showed that overall satisfaction with the EBT system was very high for elderly and disabled clients, suggesting that initial difficulties with the system did not pose a serious problem for these participants in the longrun.

Nonetheless, the substitution of EBT for food stamps may make the elderly less inclined to apply for Food Stamp Program benefits, especially if they anticipate problems adjusting to the new technology. Results from another ERS-sponsored study of recent trends in Food Stamp Program caseloads suggest that EBT may have had a negative impact on the size of the elderly caseload, particularly of "pure" elderly households (those without nonelderly adults or children.) In one of several analyses of that study, the number of pure elderly households was estimated to be 9 percent lower in States where benefits were issued by EBT than in States where benefits were issued as stamps (after controlling for other factors that affect caseloads). Since this was not the case in all analyses, further research is needed to corroborate these findings and confirm whether EBT might pose a barrier to elderly participation.

In the meantime, USDA and other organizations have proposed some possible solutions for communities, advocacy groups, and State and local Food Stamp Program agencies that address the special problems of the elderly:

- Provide extensive training opportunities for elderly applicants, including adequate hands-on training in the use of EBT cards.
- Allow benefits to accumulate and remain active for at least 6 months for households that consist entirely of elderly or disabled individuals.
- Contact individuals who have not used their benefits after a certain period of time to make sure that they know how to access them.
- Provide options for seniors to use EBT cards at meal programs that formerly accepted food stamps.

References

Kirlin, John et al. *Effects of EBT Customer Service Waivers on Food Stamp Recipients: Final Report*, Food Assistance and Nutrition Research Program Report EFAN No. 02-007, U.S. Department of Agriculture, Economic Research Service, June 2002, http://www.ers.usda.gov/publications/efan02007/

Kornfeld, Robert. *Explaining Recent Trends in Food Stamp Program Caseloads: Final Report*, Food Assistance and Nutrition Research Program Report EFAN No. 02-008, U.S. Department of Agriculture, Economic Research Service, March 2002, http://www.ers.gov/publications/efan02008/

U.S. Department of Agriculture, Food and Nutrition Service. *The Nutrition Safety Net: A Primer for Enhancing the Nutrition Safety Net for the Elderly and Disabled,* http://www.fns.usda.gov/fsp/AccessGuide/elderly.htm

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culty in using Electronic Benefit Transfer (EBT) technology—the plastic debit cards that are replacing traditional food stamp coupons as the program's principal method for distributing benefits (see box).

Thirty percent of all participant households with an elderly person received the minimum benefit of $10 per month in 2000, while only 6 percent of other households received the minimum benefit. "Why bother for $10," one nonparticipant in Tacoma said (in translation from Korean). "When I applied it was too complicated and too cumbersome to go get all the paperwork that the woman asked for. So I just didn't bother."

USDA Takes Steps To Reach the Elderly

In response to these and other studies, USDA and some States have begun testing and implementing Food Stamp Program changes designed to increase participation by eligible people age 60 and older. USDA already permits the elderly to conduct mandatory meetings with caseworkers over the telephone, instead of face-to-face, to help overcome transportation barriers. In some States, new federally funded efforts to reach the elderly seek to counteract the lack of information about program rules and benefit levels and remove barriers to participation. For example, FNS, which administers the Food Stamp Program at the Federal level, is providing $2 million in grants to six States to conduct 2-year nutrition pilot projects designed to increase eligible elderly participation. One project will test the use of a simplified food stamp application. Three projects will provide the elderly with one-on-one assistance with the application process. Two projects will provide benefits to the elderly in the form of a commodity package, in hopes of making food stamp benefits appear less similar to welfare programs that may be stigmatized in the view of some potential elderly participants. ERS will fund an independent evaluation of these pilot projects so that successful outreach models may be extended more widely in the future.

South Carolina has tested another approach to easing access to the Food Stamp Program for eligible older Americans. As noted earlier, some SSI participants in all States are automatically eligible for food stamp benefits, but they typically must nevertheless apply to the Food Stamp Program so that their benefit level may be determined. The South Carolina program automatically provides food stamp enrollment and a standardized benefit for single-person households receiving SSI, which avoids the burden of additional application tasks. To date, this approach has increased participation in the Food Stamp Program, increased client satisfaction, and decreased application costs for the State. The success of the South Carolina effort has led other States to consider similar approaches.

Food stamp participants age 60 and older have grown from 7.4 percent of all participants in 1994 to 10 percent in 2000. Between 2000 and 2015, the Census Bureau projects that the number of Americans age 65 and older will increase from about 35 million to about 46 million. After a period of slow growth, the numbers of potential older food stamp participants will increase, especially after 2005, when the oldest of the baby boom generation reaches age 60. Many of these aging boomers will have adequate financial resources for their retirement needs, but others will not. In years to come, the success of the Food Stamp Program's outreach efforts will increasingly depend on the program's success in reaching eligible older Americans.

References

Cunnyngham, Karen. *Characteristics of Food Stamp Households: Fiscal Year 2000.* U.S. Department of Agriculture, Food and Nutrition Service, October 2001.

Cunnyngham, Karen. *Trends in Food Stamp Program Participation Rates: 1994 to 2000.* U.S. Department of Agriculture, Food and Nutrition Service, June 2002.

Gabor, Vivian, Susan Schreiber Williams, Hilary Bellamy, and Brooke Hardison. *Seniors' Views of the Food Stamp Program and Ways to Improve Participation: Focus Group Findings in Washington State.* Washington, DC: Health Systems Research, Inc., November 2001. **FR**

Older Adults at Risk of Complications From Microbial Foodborne Illness

Jean C. Buzby

Although younger individuals usually face far higher rates of infection from foodborne pathogens (bacteria, fungi, parasites, viruses, and their toxins), older adults, along with the very young and the immuno-compromised, are more likely to have some of the more severe complications from these infections. In particular, some research has shown that the elderly are more vulnerable to gastroenteritis-induced deaths.

Data from the Centers for Disease Control and Prevention's (CDC) FoodNet surveillance system show that for some pathogens, older adults have lower culture-confirmed rates of infection than most or all of the other age groups, despite many age-related factors, such as decreased immune functioning and decreased stomach acid production, that predispose older persons to gastrointestinal infections and their more severe complications. These low rates may be partly due to older persons being more careful about food handling and food consumption than younger persons. Culture-confirmed rates of infection for people over age 60 range from 0.1 cases per 100,000 people for *Vibrio* and *Cyclospora* to 10.8 cases per 100,000 people for *Salmonella*. The infection rates for all Americans range from 0.04 cases per 100,000 people for *Cyclospora* to 17.4 cases per 100,000 people for *Salmonella*. Preliminary new FoodNet data from a separate telephone survey on diarrheal disease indicate that adults over the age of 65 have the lowest prevalence of diarrheal disease of any age group for monitored pathogens.

Older adults can benefit from education on safe food handling and food consumption behavior and, in turn, prevent some of the annual foodborne illnesses among this age category. In this article, the term "older adults" refers to individuals age 60 or older, following

Older adults' lower rates of infection for some foodborne pathogens may be partly explained by their more careful approach to food consumption and food handling.

Credit: PhotoDisc.

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a category used by FoodNet. The growing number of older adults in the U.S. population suggests that preventing foodborne illness and death among older adults will remain an important challenge.

Foodborne Illness Can Have Secondary Complications

CDC estimates that each year in the United States, nine microbial pathogens cause an estimated 3.5 million foodborne illnesses, 33,000 associated hospitalizations, and over 1,200 deaths (table 1). Data are unavailable on what proportion of these illnesses and deaths afflict older adults.

Most cases of foodborne illnesses are classified as "acute." These cases are usually self-limiting and of short duration, although they can range from mild to severe. Gastrointestinal problems and vomiting are common acute symptoms of many foodborne illnesses. Deaths from acute foodborne illnesses are relatively rare and more typically occur in the very young, the elderly, or persons with compromised immune systems.

The U.S. Food and Drug Administration estimates that 2-3 percent of all acute foodborne illnesses develop secondary long-term illnesses and complications called chronic sequellae. These sequellae can occur in any part of the body, such as the joints, nervous system, kidneys, or heart. One chronic sequella from *Campylobacter* infections that particularly afflicts older adults is Guillain-Barré Syndrome (GBS), which is an auto-immune reaction that can cause paralysis. GBS may afflict patients for the remainder of their lives and may result in premature death. Other causes of GBS have been documented, such as an auto-immune response to respiratory infections.

Rates of Infection Tell Part of the Story

The 1999 FoodNet data provide information on the annual cases per 100,000 U.S. persons in nine U.S. sites by age distribution for nine foodborne pathogens (see box on FoodNet). The foundation for these estimates are U.S. foodborne illnesses that were identified by clinical laboratory tests, or "culture confirmed," and recorded by FoodNet surveillance personnel in each site. To estimate the number of cases per 100,000 people for each age category, the number of reported cases in each age category was divided by the population for each age category according to the 1999 Census population estimates.

According to CDC, FoodNet data have three limitations. First, current reporting captures roughly 13 percent of the U.S. population, meaning that the data may not be nationally representative. Second, FoodNet data are limited to laboratory-confirmed illnesses that are reported by surveillance personnel. However, most individuals with foodborne illnesses are never tested to determine the type of pathogen that caused their illness, and even if the illness is laboratory confirmed, an unknown portion of these illnesses is not reported to surveillance personnel. Additionally, individuals of different age groups may not all be tested at the same rate. For example, children may be tested for foodborne illness more frequently than older adults. Third, some laboratory-confirmed illnesses reported to FoodNet can be acquired through nonfoodborne

Table 1—Nine Foodborne Pathogens Cause Over 3.5 Million Illnesses

Pathogen	Estimated total annual foodborne illnesses		
	Cases	Hospitalizations	Deaths
		Number	
Campylobacter spp.	1,963,141	10,539	99
Salmonella, nontyphoidal	1,341,873	15,608	553
Shigella	89,648	1,246	14
Yersinia	86,731	1,105	2
E. coli O157:H7	62,458	1,843	52
Cryptosporidium	30,000	199	7
Cyclospora	14,638	15	0
Vibrio	5,218	125	31
Listeria	2,493	2,298	499
Total	3,596,200	32,978	1,257

Source: CDC estimates for annual cases, hospitalizations, and deaths for people of all ages, www.cdc.gov/ncidod/eid/vol5no5/mead.htm

FoodNet Data

The Foodborne Diseases Active Surveillance Network (FoodNet) is the principal foodborne-disease component of the Centers for Disease Control and Prevention's (CDC) Emerging Infections Program (EIP). FoodNet is a collaborative project among CDC, the nine EIP State health department sites, USDA's Food Safety and Inspection Service (FSIS), and the U.S. Food and Drug Administration. The nine locations consist of select counties or statewide sites in California, Colorado, Connecticut, Georgia, Maryland, Minnesota, New York, Oregon, and Tennessee. The total population of the current catchment is 37.8 million persons, or 13 percent of the U.S. population.

FoodNet is a sentinel network that is producing more stable and accurate national estimates of the burden and sources of specific foodborne diseases in the United States through active surveillance and additional studies. Pathogens reported under FoodNet are *Campylobacter, Cryptosporidium, Cyclospora, E. coli* O157:H7, *Listeria, Salmonella, Shigella, Vibrio,* and *Yersinia*.

For more information on FoodNet, see the CDC Web site: http://www.cdc.gov/foodnet/

routes, such as contaminated water, person-to-person contact, and direct exposure to infected animals. Therefore, the reported rates do not represent foodborne sources exclusively.

For most of the nine pathogens (see box on pathogens), rates of infection are relatively high for children under age 10 and relatively low for older adults, despite many risk factors that predispose older persons to these illnesses (table 2). These lower rates for older adults may be partially explained by their reported safer food handling and food consumption behavior described later in this article. Also, nursing homes may take additional precautions to ensure food safety, such as serving only irradiated poultry.

Of the nine pathogens, *Salmonella* (nontyphoid) had the highest rate of infection for adults age 60 and older (10.8 cases per 100,000 people); *Campylobacter* had the second highest rate (9.7 cases per 100,000 people). These findings are not surprising as *Campylobacter* and *Salmonella* cause far more total illnesses each year in the United States than the other seven FoodNet pathogens.

Although younger individuals usually face far higher infection rates from these pathogens, older adults are more likely to have some of the more severe complications. For example, many studies have found that GBS has a bimodal age distribution with the highest peak for people older than 50 and that older patients are more likely than younger patients to require a ventilator and to have a poor prognosis. In a 1997 *FoodReview* article, USDA's Economic Research Service (ERS) incorporated a bimodal age distribution when estimating the annual costs of foodborne *Campylobacter*-associated GBS. ERS researchers estimated that medical costs, productivity losses, and the value of premature deaths from *Campylobacter*-associated GBS total $0.1-$1.3 billion each year. Other studies suggest that the elderly are far more susceptible to death from *Salmonella* infections than the general population.

E. coli O157:H7 has the third-highest rate of infection for older adults, 1.8 cases per 100,000 people. Some studies suggest that nursing home residents and other elderly individuals appear to be particularly vulnerable to fatal *E. coli* O157:H7 infections. *Shigella* and *Listeria* have roughly the same rate of infection for older adults, though the rates are far lower than the associated infection rates for newborns. Shigellosis is a relatively mild foodborne illness, with an estimated 14 deaths each year for people of all ages. Listeriosis is more severe, with the second-highest number of estimated annual deaths of the nine FoodNet pathogens (table 1). Although we do not have firm estimates of the number of deaths from *Listeria* by age category, a few studies found that mortality from this pathogen was highest in the elderly.

Therefore, analyzing the rates of infection among the elderly is only part of the story, as illnesses vary in severity, with some posing higher risks of hospitalization and death. Although some research is available that provides a sense of the severity for select foodborne illnesses among older adults, more information is needed to determine the distribution of severity of illness among different age groups. In particular, the annual number of foodborne illnesses and deaths among older adults is needed to estimate the economic burden of these illnesses in older adults.

Elderly Susceptible to Foodborne Illness

According to a study by James Smith, a microbiologist with USDA's Agricultural Research Service, the elderly are more vulnerable to death from gastroenteritis than younger individuals. Smith outlines this increased susceptibility as arising from a variety of factors, though he cautions that the elderly are a very heterogeneous population in terms of physiological functions, health, and susceptibility to disease.

Poor nutrition and decreased food consumption, combined with normal age-related decreases in

Table 2—Older Americans Have Lower Rates of Infection for Several Foodborne Illnesses

	Foodborne illness cases per 100,000 people by age group (years)							
Pathogen	0 to <1	1 to <10	10 to <20	20 to <30	30 to <40	40 to <50	50 to <60	60+
				Number				
Salmonella, nontyphoidal	143.2	33.4	10.1	13.3	11.0	9.1	8.6	10.8
Campylobacter spp.	40.5	18.1	9.1	19.2	17.1	14.0	12.5	9.7
E. coli O157:H7	3.7	5.5	2.4	1.6	.5	.9	1.3	1.8
Shigella	7.3	12.9	1.7	4.0	3.6	2.2	1.6	1.3
Listeria	3.4	.1	0	.1	.2	.2	.6	1.2
Yersinia	14.6	.8	.4	.3	.2	.3	.3	.7
Cryptosporidium	3.4	2.4	.8	1.4	2.8	1.5	.6	.4
Cyclospora	0	0	0	.1	.1	0	0	.1
Vibrio	.8	.1	.1	.1	.2	.3	.2	.1

Source: *CDC Foodnet 1999 Final Report.*

immune system functioning, may weaken older adults' ability to fight foodborne pathogens. According to Smith, the elderly are particularly at risk for decreased nutritional intake because of such factors as digestive disorders (malabsorption, dental problems, greater difficulty swallowing); medication (nausea, loss of appetite, malabsorption); early satiety; living alone/social isolation; altered senses of smell and taste, which decrease the enjoyment of eating; and physical disabilities, which make it more difficult to shop and prepare food. Additionally, dehydration resulting from decreased consumption of fluids can also reduce immune functioning. The sensation of feeling thirsty commonly declines with age, putting older adults at risk of dehydration if they rely on thirst to govern liquid intake.

A person's immune system functioning decreases with age, and therefore people have decreased resistance to pathogens as they age. Also, decreased contractions that push food through the intestines slow the time it takes to eliminate pathogens from the intestinal tract, allowing more time for toxin formation and damage. Stomach acid production declines with age, allowing more ingested pathogens to enter the intestinal tract. The use of antimotility drugs to relieve diarrhea or drugs that decrease stomach acidity can lead to further increases in susceptibility to foodborne disease.

Also, major surgery often leaves patients with a short period of lowered immune functioning, and when coupled with any lowered immune functioning because of age, may put older adults at a relatively greater risk of foodborne illness and other infections. And, studies show that antibiotic use among the elderly is less effective and may interfere with normal colonization of bacteria in the intestinal tract, perhaps predisposing the elderly to some foodborne infections.

Nine Pathogens Covered by FoodNet

Salmonella. Poultry, meat, eggs, and milk are some of the major food vehicles of *Salmonella* transmission. Most persons infected with *Salmonella* develop diarrhea, fever, and abdominal cramps 12-72 hours after infection. The illness usually lasts 4-7 days, and most persons recover without treatment.

Campylobacter. Most cases are associated with handling raw poultry or eating raw or undercooked poultry meat. Symptoms tend to be relatively mild but can range from diarrhea and lethargy that lasts a day to severe diarrhea and abdominal pain (and occasionally fever) that lasts for several weeks. The incubation period is 1-10 days, with most cases occurring 3-5 days after exposure.

E. coli O157:H7. People can contract the disease from eating contaminated food, from person-to-person contact (for example, in nursing homes), and from swimming in contaminated water. Food vehicles include hamburger, unpasteurized apple cider and apple juice, hot dogs, raw milk, raw potatoes, and some salad bar items, such as ranch dressing and cantaloup. Acute symptoms include abdominal cramps, vomiting, diarrhea (often bloody), and sometimes fever. The incubation period is typically 3-5 days, and most cases are relatively mild, lasting days to weeks, and do not require medical care. More severe cases may develop hemorrhagic colitis (bloody inflammation of the colon). Some people develop hemolytic uremic syndrome (HUS), which is a life-threatening disease characterized by red blood cell destruction, kidney failure, and neurological complications, such as seizures and strokes. Some people may require lifelong dialysis or a kidney transplant.

Shigella. Most infections are not foodborne but are the result of *Shigella* passing from stools or soiled fingers of one person to the mouth of another person. Vegetables may become contaminated if harvested from a field contaminated with sewage. Food handlers can contaminate food if they do not wash their hands with soap after using the bathroom. Common symptoms include diarrhea (often bloody), fever, and stomach cramps starting a day or two after exposure. The illness usually lasts 5-7 days.

Listeria monocytogenes. Raw milk products, smoked seafood, soft cheeses, refrigerated pâté or meat spreads, and ready-to-eat foods, such as hot dogs and luncheon meats, are typically linked to infection from this bacteria. Milder cases of listeriosis are characterized by a sudden onset of fever, severe headache, vomiting, and other influenza-type symptoms. The incubation period for listeriosis is 4 days to several weeks and the infection tends to last days to several weeks.

Yersinia. Infection from *Yersinia* is most often acquired by eating contaminated food, especially raw or undercooked pork products. Unpasteurized milk has also been linked to this infection. On rare occasions, *Yersinia* infections can be transmitted person-to-person when basic hygiene and hand-washing habits are inadequate. In adults, right-sided abdominal pain and fever may be the predominant symptoms from infection from *Yersinia* and may be confused with appendicitis. Symptoms typically develop 4 to 7 days after exposure and may last 1 to 3 weeks or longer.

Cryptosporidium. This parasite is one of the most common causes of waterborne disease (drinking and recreational). If food becomes contaminated by this parasite and is undercooked, it may cause diarrheal illness. Symptoms generally begin 2-10 days after infection and last around 2 weeks.

Cyclospora. This parasite is transmitted through ingesting water or food that was contaminated with infected stool. Outbreaks of cyclosporiasis have been linked to various types of fresh produce. Common symptoms include diarrhea, vomiting, and stomach cramps. The incubation period is usually about 1 week and if not treated, the illness may last from a few days to a month or longer, and the person may experience relapses. Older adults appear to be particularly more susceptible to *Cyclospora* than other age categories.

Vibrio. People can become sick from *Vibrio* by eating contaminated seafood, particularly oysters and other shellfish, or by exposing an open wound to seawater. Symptoms typically include vomiting, diarrhea, and abdominal pain. Illness in immuno-compromised persons is typically more severe and life threatening. The incubation period is around a day and the infection generally lasts several days.

Table 3—Older Americans Report Safer Food Handling and Food Consumption Behavior Than Younger Americans

	Age (years)		
	18-29	30-59	≥ 60[1]
	Percent		
Food handling behavior			
Not washing hands with soap after handling raw meat or chicken (n = 14,445)	22[2]	20[2]	13
Not washing cutting surface with soap/bleach after using it for cutting raw meat or chicken (n = 13,364)	26[2]	20[2]	13
Food consumption behavior			
Eating pink hamburgers (n = 18,397)	22[2]	22[2]	13
Eating undercooked eggs (n = 18,562)	49	51	49
Eating raw oysters (n= 16,812)	10[2]	9[2]	4
Drinking raw milk (n = 16,846)	2[2]	1	1

Note: n = sample size
[1]Reference group.
[2]Significantly different from reference group, $p < 0.05$.
Source: Altekruse et al., 1999.

Nursing Homes Pose Special Challenges

Roughly 5 percent of people age 65 and older and 20 percent of people age 85 and older are in nursing homes. Some aspects of the nursing home environment pose special challenges for health care professionals to ensure proper nutrition and the control of foodborne disease. Dr. Cynthia Henderson, chief operating officer of Oak Forest Hospital, Oak Forest, Illinois, found that the elderly in nursing homes may have decreased nutrient intake because of loss of control over food choices, inappropriate food temperatures or meal timing, the need for assistance with eating, unattractive eating surroundings, and the presence of noisy or disturbing patients during eating. Other important contributors to reduced meal intake, which result in malnutrition and dehydration, are chronic and acute disease processes, dementia, and use of multiple medications.

Nursing home residents are particularly vulnerable to foodborne illness because of underlying illnesses and age-related decreases in immune functioning, factors that may also help explain why these individuals reside in nursing homes. Also, foodborne infections may be spread among nursing home residents because of close confinement with others who may be ill.

Residents of nursing homes also face a higher risk of more severe outcomes from a foodborne illness. Charles Gerba, professor of soil, water, and environmental sciences at the University of Arizona, compared case-fatality rates for specific pathogens that cause intestinal illness in nursing home populations with case-fatality rates from the general population. Gerba found that case-fatality rates from specific foodborne pathogens were 10-100 times higher for nursing home residents than for the U.S. population as a whole. In particular, the case-fatality rate in nursing homes was 10 times higher for *Campylobacter* and 100 times higher for rotavirus (a virus that causes severe diarrheal illness, particularly in children).

On the other hand, nursing homes take positive measures to prevent foodborne illness and help ensure proper nutrition among residents. For example, trained dieticians plan the menus, and nursing homes follow procedures to reduce risks of foodborne illness, such as thoroughly cooking eggs. For the elderly who find it difficult to shop for food and prepare meals, nutritious meals prepared and served for them may be a welcome aspect of their nursing home stay.

Many Foodborne Illnesses in Older Adults Can Be Prevented

While people can't turn back the clock or stop aging, older adults can take several actions to prevent foodborne illness. They can practice a healthful lifestyle that includes exercising regularly, eating a balanced diet, obtaining regular health care, practicing good food sanitation and handling practices, and paying careful attention to personal hygiene. Additionally, many older adults could benefit from food safety education that would encourage them to reduce risky food handling or food consumption behavior. In 1995-96, over 19,000 adults in eight States were interviewed under the Behavioral Risk Factor Surveillance System study. This study found that 13 percent of respondents age 60 or older did not wash their hands with soap after handling raw meat or chicken, 13 percent did not wash cutting surfaces with soap or bleach after using them for cutting raw meat or chicken, 13 percent ate pink hamburgers, 49 percent ate undercooked eggs, 4 percent ate raw oysters, and 1 percent drank raw milk (table 3). Random-digit dialing techniques used to select respondents for the telephone interviews did not capture nursing home residents.

Older adults were significantly less likely than younger individuals to engage in these risky actions, with the exception of eating undercooked eggs, which showed no significant difference among age groups. Several factors may explain why people born before the mid-1930s are more careful with the handling and consumption of food than those born in later years. In the early 1900s, refrigeration was less common and there were fewer

processed foods, so people had to be careful with food and the custom was to thoroughly cook most foods. Additionally, older persons have had more time to acquire food safety knowledge and have had more opportunity to learn from past experiences with contaminated food, so perhaps they are more likely to implement safer food handling and food consumption practices.

A closer examination of the behavior risk study data on eggs, however, reveals that of older adults who ate undercooked eggs, 56 percent ate them more than four times a month. Of younger individuals who ate undercooked eggs, only 48 percent ate them four times a month. Undercooked eggs are a major source of *Salmonella* serotype *enteritidis*, and in the United States illness from this serotype continues to rise. Because older adults have a relatively high incidence rate for *Salmonella*, compared with other foodborne illnesses, and because they are more likely to frequently consume undercooked eggs, egg safety education efforts targeted at older adults may help reduce the incidence rate of this illness.

Older adults can also benefit from improved food safety practices of their caregivers. Many older people rely on family members or home health care workers to prepare food for them. For example, the individuals providing food for older people who live in adult care homes (residences with less than 10 occupants) may not have had training in food safety. The kitchens in these adult care homes are neither inspected nor subject to Government food regulations, as are the kitchens in assisted living facilities and nursing homes.

The U.S. population is aging—people are living longer and the proportion of older adults is rising (see "America's Older Population" elsewhere in this issue). By 2020, individuals over age 65 will make up 16.6 percent of the U.S. population. And as these individuals grow older, many of them will have less functional immune systems, many of them will be in nursing homes, and many of them will be frail; thus, they will be more susceptible to illnesses, including foodborne illness. This older population will need special care. Geriatric health care practitioners will be faced with the prospect of developing cost-effective care for this aging population.

Practicing a healthful lifestyle, which includes getting regular exercise and eating a nutritious diet, is among several steps older adults can take to reduce food safety risks.

Credit: ERS.

References

Altekruse, S.F., S. Yang., B. Timbo, and F.J. Angulo. "A Multi-State Survey of Consumer Food-Handling and Food-Consumption Practices," *American Journal of Preventive Medicine,* Vol. 16, No. 3, 1999, pp. 216-21.

Blackman, D.K, L.A. Kamimoto, and S.M. Smith. "Overview: Surveillance for Selected Public Health Indicators Affecting Older Adults —United States," *MMWR*, Vol. 48, No. SS08, December 17, 1999, pp. 1-6, Accessed Nov. 29, 2001, http://www.cdc.gov/mmwr/preview/mmwrhtml/ss4808a1.htm

Centers for Disease Control and Prevention. "1999 Annual Report," CDC/USDA/FDA Foodborne Diseases Active Surveillance Network, CDC's Emerging Infections Program, Accessed Nov. 29, 2001, http://www.cdc.gov/foodnet/annual/1999/pdf/99_annual_pdf.htm

Gerba, C.P., J.B. Rose, and C.N. Haas. "Sensitive Populations: Who Is at the Greatest Risk?" *International Journal of Food Microbiology,* Vol. 30, 1996, pp. 113-23.

Henderson, C.T. "Nutrition and Malnutrition in the Elderly Nursing Home Patient," *Clinical Geriatric Medicine*, Vol. 4, 1988, pp. 527-47.

Klontz, K.C., W.H. Adler, and M. Potter. "Age-Dependent Resistance Factors in the Pathogenesis of Foodborne Infectious Diseases," *Aging Clinical Experimental Research,* Vol. 9, No. 5, 1997, pp. 320-6.

Mead, P.S., L. Slutsker, V. Dietz, L.F. McCaig, J.S. Bresee, C. Shapiro, P.M. Griffin, and R.V. Tauxe. "Food-Related Illness and Death in the United States," *Emerging Infectious Diseases*, Vol. 5, No. 5, September-October 1999, pp. 607-25, Accessed Nov. 1, 2000, http://www.cdc.gov/ncidod/eid/vol5no5/mead.htm

Smith, J.L. "Foodborne Illness and the Elderly," *Journal of Food Protection,* Vol. 61, No. 9, 1998, pp. 1229-39. **FR**

Several Strategies May Lower Plate Waste in School Feeding Programs

Joanne F. Guthrie and Jean C. Buzby

USDA's school nutrition programs include the National School Lunch Program (NSLP) and the School Breakfast Program (SBP). On an average schoolday in 2001, 27.5 million children ate an NSLP lunch and 7.8 million children ate an SBP breakfast, at an annual cost to USDA of about $6.5 billion for the NSLP and $1.4 billion for the SBP. Because of the importance of the programs to schoolchildren's diets and because of the programs' magnitude, there is a high level of interest in how well the programs operate. One way to gauge the efficiency of a feeding program is to measure plate waste, which is generally defined as the quantity of edible food served that is uneaten. Although some food served will inevitably be wasted, excessive waste may be a sign of an inefficient operation or one that is not responsive to children's appetites or food preferences.

Excessive plate waste may also indicate that children are not fully benefiting from the nutrients offered by school meals, particularly if waste is primarily derived from foods, such as vegetables and fruits, that are underconsumed by American children in comparison with Federal dietary guidance. Nutritious, balanced meals eaten during childhood can provide benefits in terms of children's health, well-being, and academic achievement and reduce risk factors for some chronic diseases in later life. Good eating habits learned early in life may carry over into adulthood. In short, healthful eating, coupled with regular physical activity, helps to optimize physical and cognitive development, maintain a healthful weight, and reduce risk of chronic disease.

USDA's Economic Research Service (ERS) reviewed studies on plate waste in school nutrition programs, particularly the NSLP, to determine the level of plate waste in these programs, factors that contribute to plate waste, and strategies that may reduce plate waste. The best available data suggest that approximately 12 percent of foods served as part of the NSLP are wasted, resulting in an estimated direct economic loss of over $600 million. Plate waste is ubiquitous and probably impossible to completely eliminate—a review of data on household and commercial food waste indicates that consumer plate waste levels are comparable to NSLP levels. Nevertheless, reductions in plate waste can make program operations more efficient, lower costs, and enhance the program's success in meeting nutrition objectives.

Most school meal services use the offer versus serve provision to

While most schools have decreased plate waste in student meals by using the offer versus serve provision, some schools have reduced waste even further by coupling the provision with other strategies, such as self-service bars.

Credit: Ken Hammond, USDA.

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decrease plate waste while maintaining nutritional benefits. Under this provision, children may select a portion of the complete school meal (see box on school meal programs), though they are encouraged to take the complete meal. Some elementary schools decrease waste by scheduling lunch after recess. Other strategies that may be useful in decreasing plate waste include nutrition education campaigns, expanded use of self-service and regulatory options for customizing portion sizes to children's grade levels, and improvement of quality, appearance, and/or acceptability of foods.

Plate Waste in the National School Lunch Program

Plate waste has been defined as the proportion of food served that is uneaten, the amount of calories uneaten, or the amount of nutrients uneaten. Plate waste in children's school lunches has traditionally been measured via one of three methods: physical measurements (such as weighing discarded food), visual estimates made by trained observers, and food consumption as recalled by children.

ERS conducted a comprehensive review of school plate waste studies carried out between 1977 and 2001. Most studies focused on a handful of schools in a particular region. Plate waste estimates from these smaller studies ranged from 10 to 37 percent, probably indicating both local variations in plate waste and the effects of different study methodologies.

The only nationwide study that assessed the nutrient content of food actually eaten by students and the amount of food wasted was the School Nutrition Dietary Assessment Study-I (SNDA-I). The SNDA-I collected data for the 1991-92 school year by interviewing a nationally representative sample of about 3,350 students in grades 1 through 12. Students were asked to recall all the food and beverages they consumed over a 24-hour period. For school meals, students were questioned not only about the food they ate but also about the food they selected or were served but did not consume. The study did not look at food wasted in lunches brought from home.

The SNDA-I study found that NSLP participants wasted about 12 percent of the calories in the food that they were served. (Plate waste in any particular school or district may differ substantially from the NSLP average due to local circumstances and operating conditions.) Estimates of food waste at the consumer level suggest that the 12-percent estimate of plate waste in the NSLP is not unreasonable. The direct economic cost of plate waste in the NSLP is estimated at over $600 million annually. This estimate was calculated by multiplying 12 percent by $5.49 billion, the portion of the $6.2 billion NSLP allocation for fiscal 2000 that went to cash payments for meals. The estimate does not include the costs of the Federal share of State administrative expenses, any wasted commodity entitlements or bonus food, or the private costs of wasted foods purchased by students under the NSLP program. It does not adjust for differences in the costs of food items wasted (for example, more expensive entrees versus less expensive side dishes) because these data are not available. The method also assumes that the economic costs of plate waste include the overhead and labor costs of preparing and serving the meals. Finally, the estimate does not include the value of lost nutrition and health benefits.

According to the SNDA-I study, girls who participate in the NSLP tend to waste more food and nutrients than boys. For example, girls wasted 16.6 percent of calories and boys wasted 9 percent. Younger children who participated in the NSLP tend to waste a higher proportion of their food and nutrients than older children. For example, children under 11 years old wasted

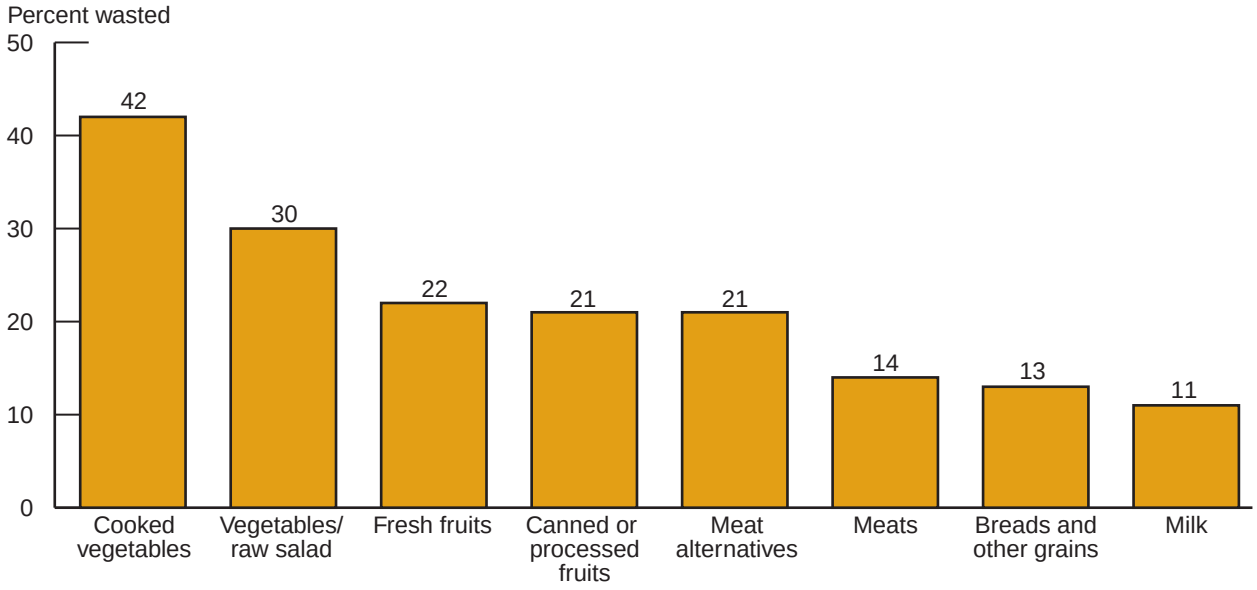
USDA School Meal Programs Allow Flexibility in Meeting Nutrition Standards

Meals served under USDA's School Breakfast Program (SBP) and National School Lunch Program (NSLP) must meet nutrition standards established by USDA's Food and Nutrition Service. These standards require that breakfasts meet one-fourth and lunches meet one-third of recommended dietary levels for food energy (calories), protein, calcium, iron, and vitamins A and C. School meals must also contain no more than 30 percent of calories from fat and less than 10 percent of calories from saturated fat and they are recommended to be moderate in cholesterol and sodium. However, States have flexibility in how they plan meals to meet these standards.

Currently, most schools plan SBP and NSLP meals using one of two approaches. Most schools use a food-based approach in which meals are planned to include minimum quantities of five meal pattern items (that is, milk, meat or meat alternative, two servings of vegetables and/or fruits, and bread or bread alternative). Some schools use a nutrient-based approach in which a computerized nutritional analysis of the week's menu ensures that the meals meet USDA standards. Schools that use a nutrient-based approach are required to serve milk and to offer at least one entree and one side dish, but within these broad guidelines, schools have flexibility in how they develop menus that meet nutrient guidelines. For example, they could serve a tortilla wrap sandwich stuffed with meat, vegetables, and cheese as an entree; a fruit cup as a side dish; and milk as a beverage.

The offer versus serve provision in school meal service is implemented somewhat differently in schools using nutrient-based approaches and those using food-based approaches to menu planning. In schools that use the nutrient-based meal planning systems, students must select at least two of the USDA meal-pattern items offered, one of which must be an entree, and may decline a maximum of two menu items. Children in schools that use the food-based menu planning systems must take a full portion of at least three of five meal-pattern items offered to get a reimbursable lunch, although they are encouraged to take all five items.

Figure 1—Kids Not Heeding "Eat Your Vegetables" Advice



Source: U.S. General Accounting Office Survey, July 1996.

14.8 percent of their food, while children age 11-14 wasted 11.9 percent and children over 14 wasted 6.5 percent.

Plate waste in the NSLP varies by food type, with vegetables and salads tending to be the most wasted items according to a U.S. General Accounting Office (GAO) survey of NSLP cafeteria managers (fig. 1). Although the SNDA-I found few differences among the percentages wasted of most nutrients, the B-vitamin folate, which is found primarily in fresh vegetables and fruit, was most wasted (15 percent), consistent with the types of food most likely to be wasted.

The 12-percent plate waste estimate is derived from a study conducted in 1991-92 and may not reflect current conditions in schools. One of the most important changes in the school foodservice environment in the past decade was the 1995 implementation of USDA's School Meal Initiative (SMI), which modernized nutrition standards for meals served under the NSLP and SBP and placed increased emphasis on nutrition education as a part of the programs. Other foodservice changes that may have influenced meal acceptance, independent of USDA involvement, include an increase in sales of foods and beverages that are not part of the school nutrition programs (see box on outside foods) and increased use of pre-prepared and brand-name foods in school cafeterias. Available plate waste studies predate these major changes and therefore do not reflect their effects.

Several Strategies Can Help Reduce Plate Waste

In light of both individual and day-to-day variations in appetite and energy needs and in tastes and preferences, it is unlikely that plate waste could be completely eliminated in any foodservice setting. School meal programs face special challenges to minimizing plate waste, such as scheduling constraints that interfere with student meal consumption or result in serving meals when children are less hungry, the difficulty in adapting meals to widely varying student energy needs and food preferences, and the availability of substitute foods from competing sources, such as school stores and vending machines. Nevertheless, lowering plate waste promotes efficient program management and can increase realization of the nutritional benefits of school meals, particularly when excessive waste is primarily derived from foods, such as fruits and vegetables, that are underconsumed in comparison with Federal dietary guidance.

If reducing plate waste were associated with encouraging children to eat more calories than they needed and the result was to promote obesity, nutritional benefits would of course be decreased. In such cases, although plate waste represents economic inefficiency, encouraging a child to "clean your plate" may add costs in the form of obesity-related health risks. A more effective approach to plate waste reduction might be to increase meal flexibility. USDA school meal regulations allow several options for increasing meal flexibility, such as using the offer versus serve provision for meal service, allowing children to serve themselves, and more closely tailoring portion sizes to appetites and needs. Other possible strategies for reducing plate waste include rescheduling lunch hours, im-

proving the quality and acceptability of food, and providing nutrition education to school children.

Increasing Meal Flexibility Lowers Waste

The offer versus serve provision for school meal service typically allows students to choose two or more USDA meal-pattern items offered (see box on school meal programs), and in many schools, offer versus serve has been coupled with strategies to match serving portions to children's appetites, such as self-service bars. As implemented in some school districts, the offer versus serve provision has increased fruit and vegetable consumption, probably by offering more choices. For example, many elementary schools in Oregon offer a "Food Pyramid Choice Menu" that features six or more fruit and vegetable choices. Daily food waste decreased by as much as 36 percent in participating school districts, according to the Oregon Department of Education, and students ate more fruits, vegetables, and grains.

Schools that participate in the NSLP and serve lunch to senior high school students are required to implement the offer versus serve provision. Offer versus serve has also become common in junior high, middle, and elementary schools. For example, close to 90 percent of elementary schools used the offer versus serve provision in the 1997-98 school year. Schools that do not use the provision serve complete meals to all students.

Because the variations in appetite and energy needs among students are probable causes of plate waste, tailoring portion sizes more closely to children's needs seems likely to decrease plate waste. USDA's Food and Nutrition Service sets minimum required serving sizes for each of several age/grade categories that are served school meals. However, schools that use a nutrient-based meal planning approach are allowed to customize serving sizes to more narrowly defined age/grade groups. A 1997-98 study of the implementation of USDA's SMI found that, while a majority of school foodservice man-

"Farm-to-school" programs and other strategies that incorporate fresh and local produce into school meals may not only increase participation in school meals and consumption of salads and other vegetables but may also decrease plate waste.

Credit: Ken Hammond, USDA.

Do Outside Foods Compete With the NSLP?

In most schools, National School Lunch Program (NSLP) and School Breakfast Program (SBP) meals are not the only purchasable food choices available to students. The School Nutrition Dietary Assessment Study II, which was recently completed by USDA's Food and Nutrition Service, reports that, as of the 1998-99 school year, students in more than 9 out of 10 schools could purchase a la carte foods and beverages (that is, items not sold as part of an NSLP or SBP meal) in school cafeterias. The range of a la carte options tends to increase as students get older. At the elementary school level, 28 percent of schools limit a la carte items to milk only; an additional 11 percent limit a la carte offerings to milk, juice, and desserts. At the middle school and high school levels, a la carte offerings tend to be more extensive and may be more likely to completely substitute for NSLP meals or meals brought from home.

Vending machines selling foods and beverages were present in 76 percent of high schools, 55 percent of middle schools, and 15 percent of elementary schools. Finally, 41 percent of high schools, 35 percent of middle schools, and 9 percent of elementary schools sold food items through school stores, snack bars, or canteens. More recently, the Centers for Disease Control and Prevention's School Health Policies and Programs Study 2000 found that 95 percent of high schools, 62 percent of middle schools, and 26 percent of elementary schools have one or more vending machines from which students can purchase food or beverages. Also, 59 percent of high schools, 39 percent of middle schools, and 27 percent of elementary schools sold food items through school stores, snack bars, or canteens.

The presence of competing food options may decrease the likelihood that a child will purchase the USDA school meal, but, for those who continue to participate in the meal program, competing foods could also affect plate waste. For example, a child could choose a federally reimbursed school lunch but also purchase additional foods, such as snack or dessert items, from competitive sources and fail to completely consume the school lunch because part of it was replaced by the competing item. In such cases, plate waste would not represent a loss of calories but rather a substitution of items of differing calorie and nutrient profiles. In the future, it may be necessary to assess the role of competing food options in children's school meal choices to fully understand the nutritional significance of plate waste.

agers reported no impact of SMI on plate waste, a larger proportion of managers using the nutrient-based approach to meal planning believed that plate waste had decreased, compared with managers using other approaches. This finding may be attributable to differences between school districts other than approaches to menu planning. Further studies would be necessary to establish whether the nutrient-based approach was more effective at controlling plate waste, as well as to what extent its benefits could be attributable to customizing portion sizes.

All schools participating in USDA meal programs have the option of allowing students to serve themselves—for example, via self-service bars. Self-service items need to meet USDA portion-size guidelines to be reimbursable, but students may have more opportunity to choose a preferred mix of items. One study of elementary schoolchildren in Louisiana found that use of self-service bars for fruits and vegetables resulted in students consuming about one-half serving more of these foods; plate waste also decreased by a small amount.

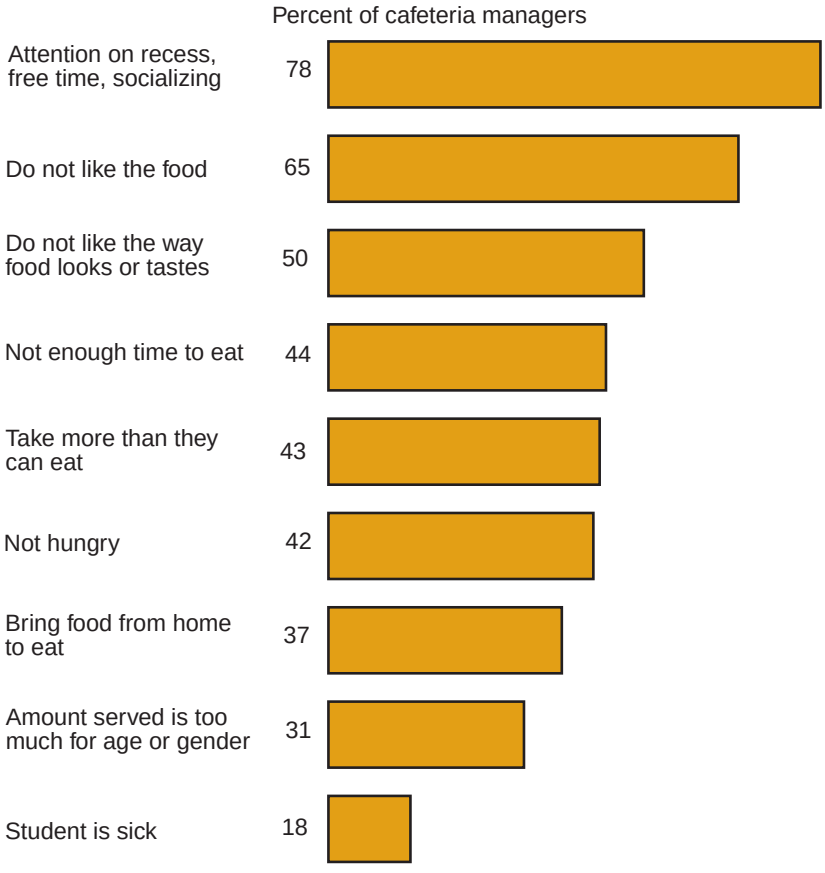
Lunch Schedules Affect Plate Waste

Rescheduling lunch so that it follows recess has also been shown to reduce plate waste, potentially providing cost savings to the NSLP and increasing the benefits that children receive from the program. For example, a study conducted in Illinois showed that overall food waste decreased from 35 percent to 24 percent when recess was rescheduled to precede lunch. The School Health Policies and Programs Study 2000 conducted by the Centers for Disease Control and Prevention (CDC) found that only 18.2 percent of elementary schools scheduled recess before lunch for half or more of classes.

Lengthening school lunch periods may also decrease levels of plate waste. Forty-four percent of public school cafeteria managers surveyed reported "not enough time to eat" as a possible reason for students' plate waste (fig. 2). Studies suggest that in most cases, however, children have adequate time to eat their lunches. A study sponsored by the National Food Service Management Institute found a small number of cases in junior and senior high schools in which long waiting lines resulted in students having less than 10 minutes to eat, but effects on plate waste were not assessed.

Lunches that are served very early or very late in the day may also increase plate waste. Forty-two percent of NSLP cafeteria managers surveyed cited children being "not hungry" as one reason for plate waste. Lunches scheduled too soon after breakfast may be a cause of children not being hungry. Moving some of the earlier lunch periods to later times might reduce the volume of plate waste. On the other hand, lunches that are scheduled late in the day may increase plate waste if students have access to alternate foods, such as items from vending machines and snack bars or food brought from home. However, only a minority of NSLP cafeteria managers who responded to the survey felt that changing lunch schedules would decrease plate waste. Concerns also have been raised that scheduling other school activities during lunch, such as club meetings and pep rallies, may discourage children from eating school meals. Data on the effects of these scheduling issues on plate waste are not available.

Figure 2—Cafeteria Managers Cite Socializing and Food Dislikes as Most Likely Reasons Children Waste Food



Source: U.S. General Accounting Office Survey, July 1996.

Improving NSLP Food and Nutrition Education Could Lower Waste

Improving the quality, appearance, and acceptability of foods may also be an effective strategy, but the effects of such improvements are not well documented. ERS identified four strategies currently used to improve the quality, appearance, and/or acceptability of NSLP meals:

(1) **Improving the selection of commodities donated by USDA.** USDA makes commodity food products available to all schools participating in the Federal school meal programs. While these foods are generally viewed favorably by NSLP cafeteria managers, USDA continues to work to further improve the nutritional profile and acceptability of these foods. A study of the effects of increasing the amount of fresh fruits and vegetables made available to schools indicated that such improvements may decrease plate waste. Effects of other changes in commodities on plate waste have not been studied.

(2) **Increasing the use of produce and local foods.** Some schools are incorporating more fresh and local produce and less prepackaged or processed foods into school meal offerings. Case studies of schools that have developed "farm-to-school" programs suggest that such foods may increase participation in school meals and consumption of salad and other vegetables, the food categories most likely to be wasted. For example, the Berkeley, California, Unified School District implemented a "farmers market salad bar" that became very popular with students—NSLP participation increased and students overwhelmingly chose salad bar items over other selections. Such strategies, however, may require changes in operating and purchasing procedures and may be relatively costly for schools to implement.

(3) **Using commercial foodservice companies and/or their products.** An increasing number of schools that participate in the NSLP are using commercial foodservice companies to plan, prepare, and serve school meals. USDA leaves the decision whether to use foodservice management companies and/or brand-name fast foods up to local school food authorities. Although schools that use foodservice management companies appear to do so primarily for financial reasons, 26 percent of those responding to a GAO survey indicated that "increasing the nutritional value of meals" was also a motive. Cafeteria managers cite use of brand-name fast food items as a strategy for decreasing plate waste, presumably by increasing acceptance. A GAO survey of cafeteria managers indicated that an estimated 13 percent of public schools participating in the NSLP during the 1995-96 school year decided to offer brand-name fast foods as part of the USDA school meal, up from 2 percent in 1990-91. The CDC's School Health Policies and Programs Study 2000 reported that 20 percent of schools offered brand-name fast foods to students, but this figure includes foods sold both as part of the NSLP and as a la carte items. NSLP meals that include brand-name fast foods must be in compliance with USDA's nutritional standards.

(4) **Increasing student input**. Student advisory groups could help create improved menus that are more acceptable to students, which would likely reduce plate waste. USDA regulations encourage school food authorities to involve students—as well as parents—in their programs. Some schools already have advisory committees. The American School Foodservice Association (ASFSA) promotes nutrition advisory councils, which it describes as "school clubs that bring students together" and "reinforce the idea that school nutrition programs are for them." ASFSA reports that 365 schools nationwide had nutrition advisory councils chartered with ASFSA as of spring 2000. This number likely belies the prevalence of this strategy, as many other advisory groups operate independently of the ASFSA program.

Nutrition education has also been cited as a means for improving children's diets and promoting acceptance of healthful menu items, particularly when coordinated with foodservice activities. One study found that a nutrition education program that involved schoolchildren in preparing and tasting foods later served in the school cafeteria was associated with decreased plate waste. The researchers selected several nutrient-rich foods, such as dark-green and deep-yellow vegetables, that are underconsumed by American children. Schoolchildren who participated in cooking/tasting activities that featured these foods ate more—and wasted less—of these foods when they were later served in the cafeteria. These results indicate that nutrition education may be a useful strategy for decreasing plate waste and enhancing program benefits.

Recent Changes in the School Meal Programs May Affect Plate Waste

In this study, ERS synthesized findings from a variety of studies of plate waste in schools participating in the NSLP. Several studies showed that plate waste can be reduced by employing the offer versus serve provision in school meal service and scheduling recess before lunch. Some evidence suggests that nutrition education may

reduce plate waste, particularly when the education is strongly linked to foods served in the school cafeteria. Strategies for tailoring portion sizes to children's appetites, preferences, and needs, such as allowing children to serve themselves, also may decrease plate waste without reducing nutrition benefits, but there is less research on the effects of these strategies.

Finally, most plate waste studies predate major changes in the school foodservice environment between 1996 and the present. Among the most important of these changes are (1) the implementation of USDA's School Meal Initiative, which modernized the nutritional guidelines for the school meal program and promoted increased nutrition education in schools, and (2) the increase in sale of foods and beverages not part of the Federal school meal programs. Another issue is the trend in school foodservice toward more use of pre-prepared items versus items prepared in the cafeteria and the potential effects of this trend on quality and acceptance of NSLP meals. These changes may also have affected plate waste; however, their effects have not yet been studied.

References

Burghardt, J., and B. Devaney. *The School Nutrition Dietary Assessment Study: Summary of Findings*. Prepared by Mathematica Policy Research, Inc., Princeton, NJ, under Contract No. 53-3198-0-16, with the U.S. Department of Agriculture, Food and Nutrition Service, October 1993.

Devaney, B.L., A.R. Gordon, and J.A. Burghardt. "Dietary Intakes of Students," *American Journal of Clinical Nutrition*, Vol. 61, suppl., 1995, pp. 205S-212S.

Getlinger, M.J., C.V. Laughlin, E. Bell, C. Arek, and B.H. Armandi. "Food Waste Is Reduced When Elementary-School Children Have Recess Before Lunch," *Journal of the American Dietetic Association,* Vol. 96, No. 6, September 1996, pp. 906-8.

Rodgers, P., T. Schuster, and J. Anderson (Technical Advisor, A. Sánchez). *Time Required by School Children to Eat Lunch.* National Food Service Management Institute, University of Mississippi, October 26, 1999.

U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation. *School Nutrition Dietary Assessment Study-II: Summary of Findings.* M.K. Fox, M.K. Crepinsek, P. Connor, and M. Battaglia, Project Officer, P. McKinney, July 2001.

U.S. Department of Agriculture, Food and Nutrition Service. *The School Meals Initiative Implementation Study: First Year Report*. S. Abraham, M. Chattopadhyay, C. Sullivan, L. Mallory, and D.M. Steiger of the Gallup Organization and L. Daft, A. Arcos, and B. Wilbraham of PROMAR International, October 2000.

U.S. General Accounting Office. *School Lunch Program: Cafeteria Managers' Views on Food Wasted by Students,* GAO/RCED-96-191. Report to the Chairman, Committee on Economic and Educational Opportunities, U.S. House of Representatives, July 1996.

Wechsler, H., N.D. Brener, S. Kuester, C. Miller. "Food Service and Foods and Beverages Available at School: Results From the School Health Policies and Programs Study 2000," *Journal of School Health*, Vol. 71, Issue 7, September 2001, pp. 313-24. **FR**

This article summarizes a report prepared by USDA's Economic Research Service at the request of the U.S. House of Representatives Committee on Appropriations on plate waste in school nutrition programs, factors that contribute to plate waste, and strategies that may reduce waste. The full report, *Plate Waste in School Nutrition Programs: Final Report to Congress,* by Jean C. Buzby and Joanne F. Guthrie, E-FAN-02-009, March 2002, can be found on the ERS Web site at www.ers.usda.gov/publications/efan02009/efan02009.pdf.

ERS Releases New Electronic Report on the U.S. Food Marketing System

A new report released by USDA's Economic Research Service (ERS), *The U.S. Food Marketing System, 2002: Competition, Coordination, and Technological Innovations Into the 21st Century*, analyzes recent trends and developments by the firms that process, distribute, prepare, and sell food in the United States. Separate chapters on food manufacturing, food wholesaling, food retailing, and food service look at important developments with regard to structure, organization, productivity, technology, and trade. The new report is an electronic version of the former *Food Marketing Review*.

Notable trends occurring throughout the U.S. food marketing system include an increase in mergers and acquisitions, leading to fewer and larger firms. Changes in concentration among sectors vary by food marketing stage, segments within a particular stage, and types of products processed and handled. Recent concentration in the retail sector has seen the share of U.S. grocery store sales by the top four food retailers increase from 16.6 percent in 1996 to 27.4 percent in 2000 (fig. 1). By contrast, this four-firm sales share declined from 17.1 percent in 1987 to 16.6 percent in 1996. Mergers and acquisitions have also accelerated in foodservice distribution. In 1995, sales by Sysco, the leading U.S. foodservice distributor, outpaced its nearest competitor by 84 percent. With U.S. Foodservice's purchase of Alliant in 2001, this gap closed to 28 percent.

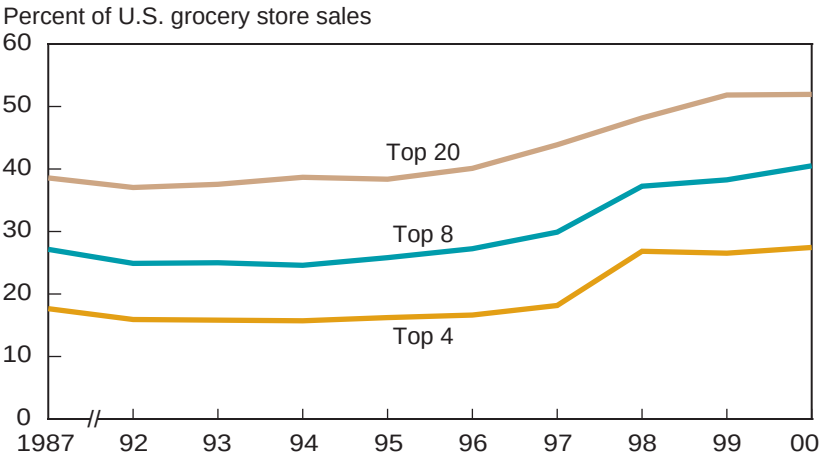
Buyer-seller relationships are changing throughout the food supply chain as stages become increasingly interdependent. For example, farmers are increasingly engaged in contracts and vertical integration in some agricultural sectors. In 1996, 30 percent of hogs were sold under production contracts, up from 2 percent in 1980. Also, traditional food wholesalers that buy food from manufacturers and resell to retail food stores are losing ground. Today, manufacturers increasingly deliver their products directly to retail stores, while self-distributing retailers own their own distribution centers and buy directly from manufacturers.

Competitive pressures are mounting for farmers to deliver the right types of products at the right time. Retailers are demanding a variety of high-quality products (for example, organic produce, exceptionally lean pork) delivered in a timely fashion. These demands increase the need for agricultural product differentiation and precise information regarding prices, product quality, and scheduling. The

The significant increase in hogs produced under contract from 1980 to 1996 typifies the changing nature of buyer-seller relationships in the Nation's food marketing system.

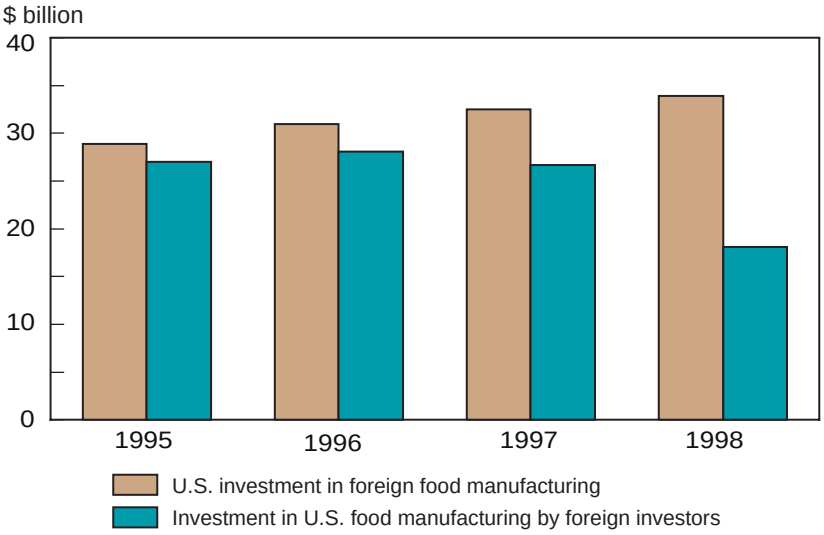
Credit: PhotoDisc.

Figure 1—Consolidation Has Contributed to Increased Shares of U.S. Grocery Store Sales by the Largest 4, 8, and 20 Retailers



Note: Data not presented for 1988-91.
Sources: *Monthly Retail Trade Survey*, Census Bureau; Company annual reports.

Figure 2—Investment Abroad in Food Manufacturing by U.S. Companies Continues To Rise



Source: *U.S. Direct Investment Abroad*, Bureau of Economic Analysis.

food marketing system has responded by embracing new technology that improves the flow of information and assists with scheduling and inventory. Improved information enables firms to reduce costs and instances of empty grocery shelves or out-of-stocks and better target alternative consumer segments. In addition, grocery retailers are experimenting with new formats (for example, supermarket-sized natural food stores) to meet the growing needs of natural food and ethnic consumers.

International trends in trade and foreign direct investment offer U.S. food marketers an alternative to the slowly growing domestic food market. Such trends leave the U.S. food marketing system increasingly exposed to foreign economic developments, policies, and changing consumer preferences. The United States is the world's largest importer and exporter of processed food. In 2000, the United States exported $30 billion worth of processed food and imported processed foods worth $36.8 billion. U.S. food processors continue to expand operations overseas (fig. 2). Foreign-owned food retailers have used acquisitions to increase investments in U.S. food retailing.

The full report, *The U.S. Food Marketing System, 2002: Competition, Coordination, and Technological Innovations Into the 21st Century,* by Steve Martinez (coordinator), J. Michael Harris, Phil R. Kaufman, and Charlene Price, Agricultural Economic Report No. 811, can be accessed through ERS's Web site at http://www.ers.usda.gov/publications/aer811/ **FR**

Consolidated Markets, Brand Competition, and Orange Juice Prices

In a new report released by USDA's Economic Research Service, researchers examined orange juice prices in 54 U.S. markets to determine if and how a highly concentrated marketing system affects retail prices. Results show little compelling evidence that consolidated markets engage in noncompetitive pricing. Instead, regional consolidation of food retailers and their integration into wholesaling appears to lead to lower market prices for orange juice. Increased private label competition with the leading national brands also contributes to lower orange juice prices.

Market shares for the four largest grocery chains in the 54 markets varied from over 85 percent to less than 50 percent. With such wide variation in retail concentration, the researchers grouped the data into the 10 markets with the highest four-firm concentration and the 10 markets with the lowest concentration, then compared prices between the two groups.

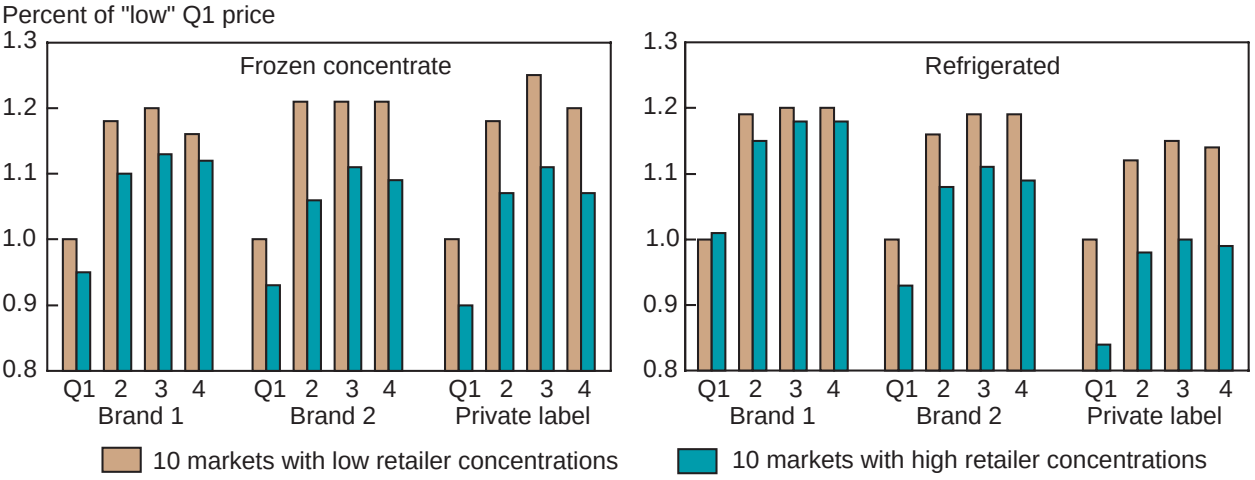
The researchers analyzed retail price data for six orange juice products—two branded frozen concentrate products, one private label frozen concentrate product, two branded refrigerated products, and one private label refrigerated product. The private label products represent not a specific product but the average price across all private label or store brand frozen concentrate or refrigerated products sold within a specific market. Prices are reported as averages for four 3-month periods.

For all three frozen concentrate products, average prices were lower for each quarter in the group of markets with a high degree of retail concentration (fig. 1). Refrigerated orange juice products were also priced lower in markets with high retailer concentration, with the exception of the first-quarter Brand 1 product where average prices were about the same in both the low- and high-concentration markets.

Frozen concentrate products also had lower prices in markets with high grocery wholesaler concentration, but the relationship between refrigerated product prices and wholesaler concentration was less clear. Markets with the highest concentration of integrated retailers who operate their own distribution warehouses had lower orange juice prices than markets with a lower concentration of integrated retailers. Most of these findings were replicated using the more rigorous approach of regression analysis, where the different influences on prices are isolated.

The complete report, *Consolidated Markets, Brand Competition, and Orange Juice Prices,* by James Binkley, Patrick Canning, Ryan Dooley, and James Eales, Agricultural Information Bulletin No. 747-06, can be accessed through the ERS Web site at http://www.ers.usda.gov/publications/aib747/aib74706.pdf. Printed copies can be obtained from the authors (pcanning@ers.usda.gov). **FR**

Figure 1—Retailer Concentration and Orange Juice Prices



Note: Quarterly market prices of orange juice for period ending November 2, 1990.
Source: Department of Agricultural Economics, Purdue University.

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